

# WILLIAMSON COUNTY

# S O I L S



## SOIL REPORT 79

UNIVERSITY OF ILLINOIS  
AGRICULTURAL EXPERIMENT STATION

In cooperation with SOIL CONSERVATION SERVICE, U. S. Department of Agriculture

## COVER PICTURE

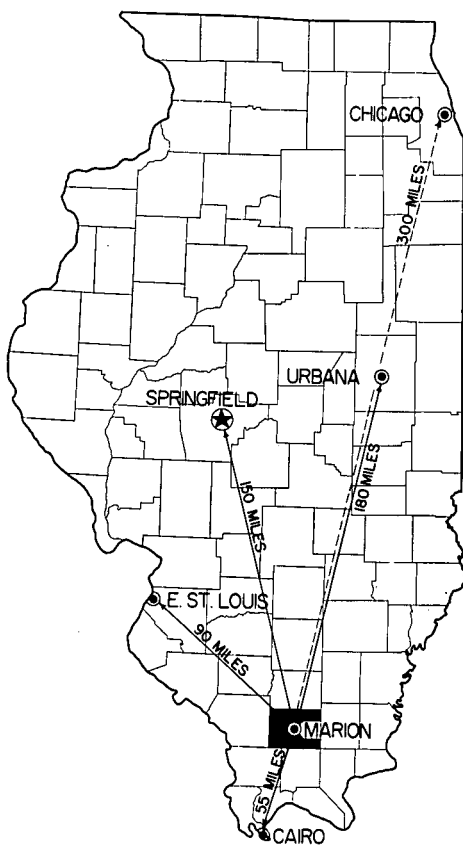
The picture on the cover of this report is a view from the air of an area in the west-central part of Williamson county.

Portions of the towns of Carterville and Crainville show in the upper right of the picture. Part of one strip coal mine shows in the upper left, and a small part of a second strip mine ("S. M."), at the far right. A small neck of Crab Orchard Lake extends into the lower part of the picture. Highway Illinois 13 runs east and west through the central part.

Soil type boundaries and numbers have been added to the photograph. The four soil types shown are Hosmer silt loam (214), Stoy silt loam (164), Weir silt loam (165), and Belknap silt loam (382). Hosmer, occurring on moderate to steep slopes along the draws, is moderately well drained. Stoy, which occurs on gentle slopes, is imperfectly drained, while Weir, which is found on flats, is poorly drained. Belknap, an alluvial soil, occurs in the bottoms of drainageways.

*(Picture supplied by  
U. S. Department of Agriculture)*





Williamson county lies in southern Illinois. Marion, the county seat, is 150 miles from Springfield, 180 miles from Urbana, and 300 miles from Chicago.

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# WILLIAMSON COUNTY SOILS

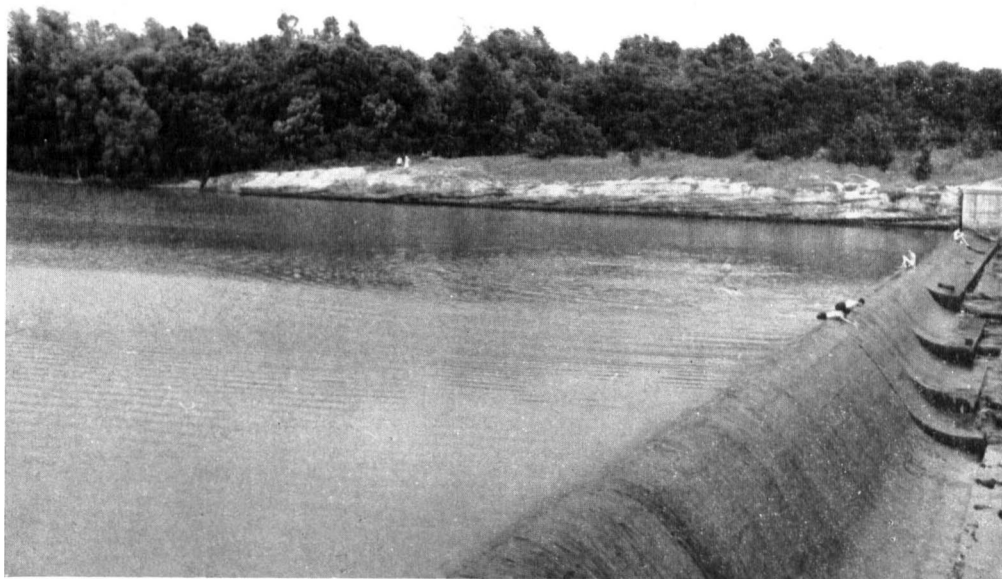
By J. B. FEHRENBACHER and R. T. ODELL

**T**HIS SOIL REPORT has been prepared to help answer these questions about the soils of Williamson county: *What soils occur in the county? What are their characteristics and how are they classified? What crops are adapted to each soil and how much will they yield? What are the natural and cultural features of the county important to its agricultural development?*

The soil map shows the extent and location of the various soil types and also the slope and erosion conditions of each area delineated.

This report is concerned primarily with those soil characteristics which do not change much over a period of years. Thus, the facts gained from past experience and experimentation can be used in classifying soils and in predicting their behavior under various uses and management systems. Some interpretive groupings of the soils are made. It is probable that reinterpretation and regroupings of the soils may be needed from time to time to meet various planning needs.

Characteristics that are important in determining the best uses of soils are also considered. Specific management suggestions, however, are not included.



Spillway at Crab Orchard lake dam. The largest man-made lake in Illinois, Crab Orchard adds materially to the water resources of Williamson county. (Fig. 1)

Instead, they are given in a separate soil management guide entitled, "How to Know Your Soils and Manage Them Wisely, A Personal Guide for Every Farmer in Williamson County, Illinois" (5)<sup>a, b</sup>. This guide may be revised from time to time as new management facts become known and new farming techniques are developed. In other words, it is designed to give the farmer up-to-date, specific management suggestions for his own farm. The guide also includes a large-scale soil map of an individual farm on an aerial photograph, rather than the assembled small-scale county soil map accompanying the present report. The large-scale map is especially useful in planning soil and water conservation measures on individual farms.

## HOW TO USE THE SOIL MAP AND SOIL REPORT

**Examine the soil map.** The soil map of Williamson county consists of six sheets. On the back of each is indicated the part of the county that it covers.

General soil conditions are indicated by broad color groups on the soil map. Various shades of *yellow* and *brown* are used for light-colored upland soils developed under forest, while shades of *blue* are used for soils that develop under prairie grass. Terrace soils are indicated by shades of *pink* and bottom-land soils by shades of *green*.

Soil types are subdivided into smaller mapping units on the basis of slope and the thickness of remaining surface and subsurface or degree of erosion. Each mapping unit is indicated by a symbol consisting of two or three parts: *First*, the soil type number; *second*, a capital letter indicating the slope group; and *third*, a dash above or below the slope group letter to indicate the thickness of remaining surface and subsurface soil (absence of a dash indicates little or no erosion). For example 14 $\bar{C}$  is the symbol used for Ava silt loam (indicated by the "14"), where the slope is 4 to 7 percent

(indicated by the "C"), and where there are 3 to 7 inches of surface and sub-surface soil (indicated by the bar above the letter). In the vicinity of Herrin, the symbol + following the slope group letter on small bottomlands indicates that mine-wash material has covered the area. A star following the complete soil type, slope, and erosion symbol (for example, 214 $\bar{C}$ \*) indicates the presence of numerous mine sinks.

The same color is used on the map for all areas of a given soil type regardless of the slope or erosion symbol. The various soil type names, soil type numbers, and the meanings of the slope group letters, erosion symbols, and other symbols are given in the legend on each map sheet.

To help in finding a particular farm or tract of land, many cultural features such as roads, railroads, towns, and farmhouses are indicated. Section boundaries, section numbers, township and range numbers, and physical features such as streams, lakes, and reservoirs are also shown. If the legal description is known, a tract of land can be easily

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<sup>a</sup> Italicized numbers in parentheses refer to the literature cited on page 71.

<sup>b</sup> The Williamson county soil management guide is available through the offices of either the Williamson county farm adviser or the Williamson county soil conservation district.

located by using township and range and section numbers. Otherwise, you can start with a recognized point, such as a town or crossroad, and if you know the distance and direction of a tract of land, you can easily find it.

**Study the characteristics of the soils.**  
After you have located the tract of land

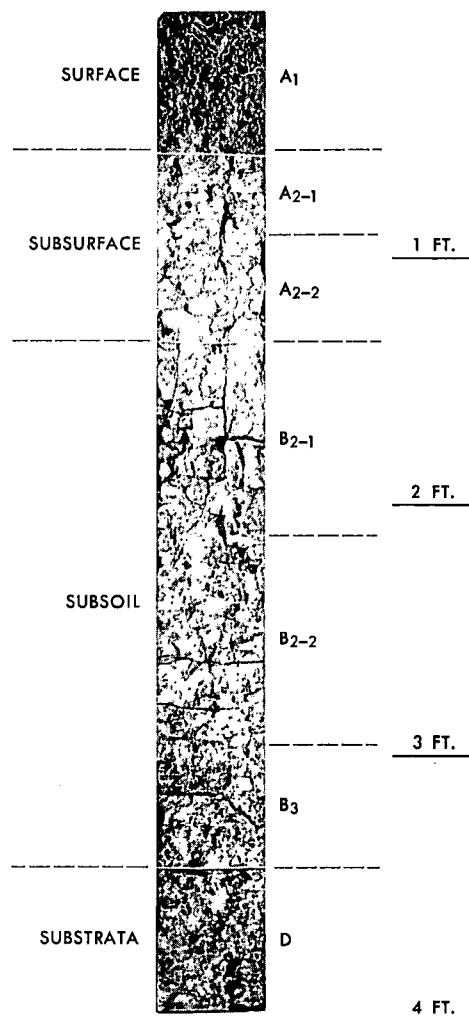
you are interested in and have identified the mapping units on it, turn to the index, page 72, to find where your soil types are described.

In studying the soil type descriptions note particularly that soils are separated into types on the basis of their characteristics to a depth of 40 inches or more, *not on surface character alone*. The surface or A horizon of one type is frequently little or no different from that of another, and yet the two types may differ widely in agricultural value because of differences in the B horizon. The nature of the B horizon is important in determining the drainability and water-supplying power of most soils, especially during critical periods of excess rainfall or drouths.

As shown in Figure 2, a soil profile is a vertical section from the top down through the various horizons to a depth of 40 inches or more. Most upland soils have three or four main horizons, an A, B, C, and sometimes a D. The relationship of these letter designations of horizons to the general horizon terms such as surface, subsurface, subsoil, and substratum is also indicated in Figure 2.

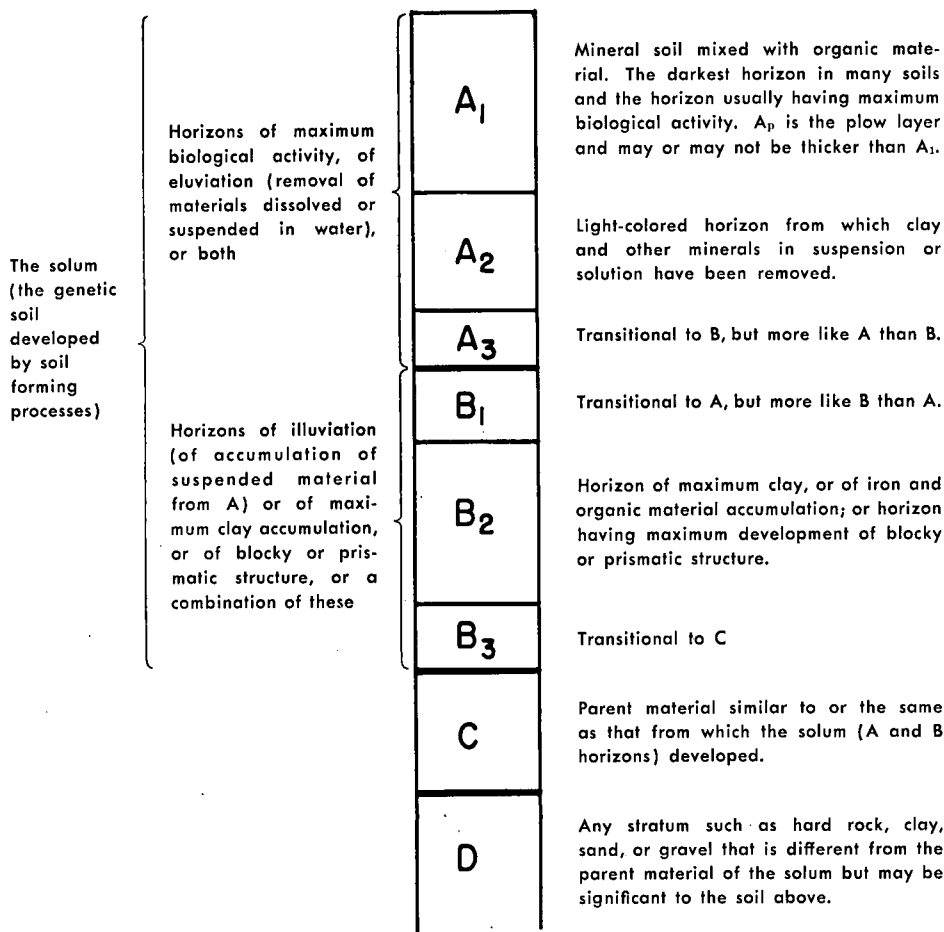
In this report the letter designations of horizons are used in the soil type descriptions and are defined as shown in Figure 3. Many soils do not have all of the horizons and subhorizons indicated in this diagram.

In studying the characteristics of various soils, it is also important to understand that each soil type includes a range in properties, and that the boundaries between soil types are not necessarily sharp. Sometimes types are so intermingled that it is impossible to show them separately on the soil map. Hickory loam and Ava silt loam, in many areas of Williamson county, are two such intermingled types. They are shown on the map as 8-14 and indicated in the legend as a complex.



This profile of Cisne silt loam shows the various layers or horizons to a depth of 4 feet, as well as the relationship between general horizon terms (on the left) and the more technical horizon letter designations on the right.  
(Fig. 2)





Principal horizons of upland soils. Not every horizon and subhorizon shown here, however, is necessarily present in all soils. (Adapted from *Nomenclature of soil horizons*, U. S. Dept. Agr. Handbook 18, pp. 174-183. 1951.) (Fig. 3)

## NATURAL FEATURES OF WILLIAMSON COUNTY

**Location and size of county.** Williamson county is located near the center of the southern tip of Illinois. The Mississippi river is about 20 miles west of the county; the Ohio river is about 30 miles away on the east, and about 25 miles on the south.

Williamson county has an area of 441 square miles and is rectangular in shape, being about 24 miles east and west and about 18 miles north and south. The county courthouse in Marion is located

very nearly, if not exactly, in the center of the county.

**Physiography.** The northern three-fourths (approximately) of the county is in the Mount Vernon Hill Country of the Central Lowland province (10), and the southern one-fourth is in the Shawnee Hills section of the Interior Low Plateau province. The northern portion was covered by the Illinoian glaciation except for a few, relatively high, isolated

areas in the east-central and northeastern parts. These isolated areas are essentially similar to the unglaciated southern part of the county.

The glaciated section is characterized by low relief, wide valleys, and a relatively well-developed drainage system. The glacial drift is thin, and the topography is largely controlled by the underlying bedrock of Pennsylvanian age. The thinness of the drift is evident in a belt of strip coal mines running more or less east and west across the central part of the county (Figure 4).

A large portion of the county drains westward into the Mississippi river through Crab Orchard creek and Big Muddy river. The eastern part of the county drains eastward into Saline river and finally into the Ohio river.

In 1940 a dam was completed across Crab Orchard creek valley very near the western boundary of Williamson county to form Crab Orchard lake (15). At

the present time this is the largest man-made lake in Illinois, having a shoreline of about 103 miles and a total area of about 11 square miles or 7,000 acres at spillway level. The lake is used as a migratory waterfowl refuge, as a source of water for industries and towns, and for fishing and other recreation.

Two auxiliary lakes to Crab Orchard are in the hilly, unglaciated southwestern part of the county. After a delay during World War II, one of these, Little Grassy, was completed, and work on Devil's Kitchen lake was resumed during the later part of 1955.

A prominent physiographic feature in the northwestern part of Williamson county is the broad lake-laid terrace along Big Muddy river. This nearly level area varies from 1 to 4 miles in width.

The southern unglaciated section of the county is a complex dissected upland having narrow ridgetops between deeply



Cut along a strip-mined area showing thinness of drift (about 30 feet) above bedrock. (Fig. 4)

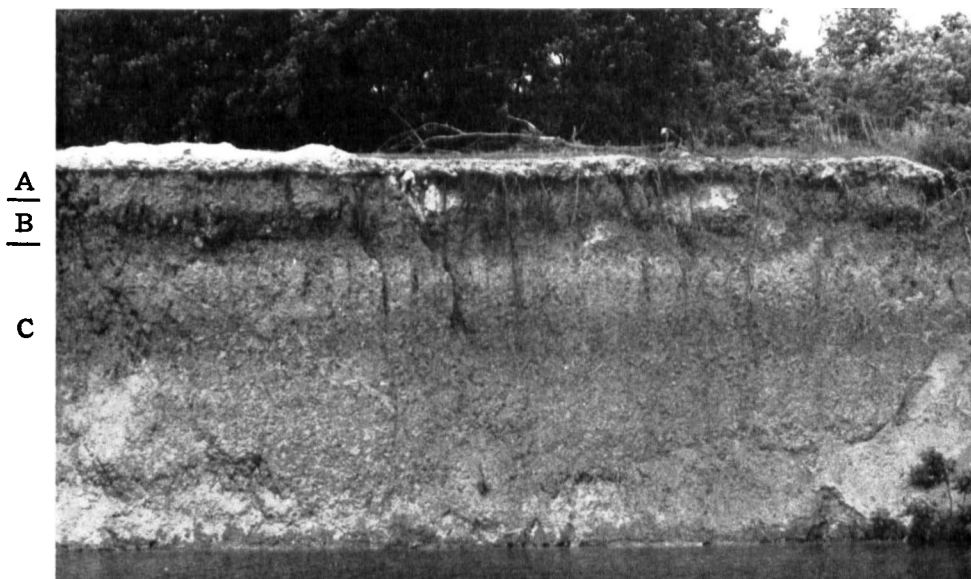
incised valleys. Many rock outcrops, chiefly of sandstone, occur along the valley walls.

Elevations near the southern boundary of Williamson county vary from 410 feet above mean sea level at Stonefort, which is in a valley, to 600 feet at Pulleys Mill, and over 700 feet at places in Grassy township in the southwestern corner. Following are some of the elevations in the central and northern parts of the county: Hurst and Bush, 400 feet; Herrin and Johnston City, 420 feet; Marion, 430 feet; Crab Orchard, 500 feet; Corinth, 520 feet. The concrete spillways of Crab Orchard lake and Little Grassy lake have crest elevations of 405 and 500 feet respectively.

**Geology.** The bedrock surface of all of Williamson county is a part of the Pennsylvania system (7). The county is near the southern limit of the Illinois basin, and the regional dip of the formations, in general, is towards the center of this basin to the north and northeast.

In the northern part of the county, the bedrock has a thin covering of glacial till of Illinoian age. When this till was deposited it was calcareous and about a loam in texture. Before it was covered by loess, it was exposed to weathering long enough that, on nearly level to gently sloping areas, carbonates were leached to depths varying from 10 to 20 feet; and well-developed soils were formed in its upper part. During the Wisconsin glacial age the old till soils were covered by two distinct loess sheets — the Farmdale and later the Peorian — from which the present upland soils have developed.

In the unglaciated sections of the county, the Peorian and Farmdale loess sheets are underlain by a third loess sheet, the Loveland. This was deposited somewhat earlier than the Illinoian glacial till and is the oldest loess sheet in the area. It lies directly on bedrock or on residual soils developed from the bedrock. Well-developed soils were formed in the Loveland loess before the Farm-



Cut along a strip-mined area showing the overlap of Wisconsin-age clays on older soils: A — loess; B — 1 to 2 feet of Wisconsin-age clays; C — Illinoian till-derived soil with some early Wisconsin loess in upper part. (Fig. 5)



Open strip coal mine operation in Williamson county.

(Fig. 6)

dale was deposited, but they are preserved only on the flatter ridgetops, where they escaped serious erosion.

The main source of the loess in Williamson county was the Mississippi river valley. Total loess thicknesses on gently sloping, uneroded areas vary from about 150 inches in the southwestern part of the county to about 40 inches in the northeastern part. As will be discussed later (page 49), loess thickness has an important bearing on the degree of weathering in Williamson county soils.

The loess, when first deposited, was calcareous and composed mainly of silt-size (.05 to .002 millimeters) particles. Since deposition of the loess, enough time has elapsed for all the carbonates to have been removed by leaching. There are, however, a few places near the southern extent of the Illinoian glaciation where calcareous silts (apparently laid down in ice margin ponds) are exposed in road cuts.

The lake-laid sediments in the terrace area along Big Muddy river in the northwestern part of the county are of Wisconsin age. Although the Wisconsin

glacier reached only as far south as central Illinois, it is believed that, as the ice melted, the extremely high waters of the Mississippi river flowed upstream in the Big Muddy river and deposited the fine-textured sediments over the nearby lowlands. In some roadcuts and strip coal mines near the upland border of this terrace area, Wisconsin-age clay lenses as thin as 1 or 2 feet overlap the older loess and Illinoian till soils (Figure 5). The broad, flat, high-level terraces were covered later with 6 to 24 inches of loess. Narrow, low-level terraces occur next to the Big Muddy flood plain. They probably were formed by the river cutting down into the lake-bed deposits. Since the low-level terraces are more recent than those at the higher level, the loess covering them is seldom more than 12 or 14 inches thick, if it is present at all.

**Mineral resources.** The most important mineral resource of Williamson county is coal (2). The county is part of one of the largest bituminous coal-producing districts in the United States. Both

shaft and open strip mines are used (Figure 6). Other important mineral resources in nearby counties include limestone, sand and gravel, oil, fluorspar, fuller's earth, tripoli, and shale and clay.

**Water resources.** Natural water resources of Williamson county are not great (8). The Big Muddy river terrace area has glacial deposits in which small water wells are a possibility. Shallow drift wells and cisterns are used on most farms in the Illinoian till area; cisterns, together with some shallow wells, are used in the southern unglaciated section. Deep rock wells, in general, are not a very good source of water. Many farmers depend upon ponds for water for livestock and other uses. Surface water is also the principal water source for towns and industries. Topography, rainfall, and soil conditions are generally favorable to the development of reservoirs in this area.

Besides Crab Orchard, Little Grassy, and Devil's Kitchen lakes, most towns in Williamson county have their own municipal reservoirs.

**Climate.** At the Carbondale station (12), a few miles west of Williamson county, the mean July temperature for 1910 through 1946 was 79.8° F., and the mean January temperature was 34.9° F. Average annual rainfall was 44.7 inches, with a low of 30.76 inches in 1914 and a high of 74.50 inches in 1945. Average annual snowfall was 13.6 inches. From 1921 through 1946, the average rainfall during the growing season, April through September, was 24.07 inches, with a low of 12.23 inches in 1941 and a high of 44.20 inches in 1945. The average date of the last killing frost in the spring was April 13 and the average date of the first killing frost in the fall was October 23. Thus the average growing season was 193 days.

## CULTURAL FEATURES OF WILLIAMSON COUNTY

**Organization and population.** Between 1810 and 1826, various settlements were made in what is now Williamson county. After that the population grew rapidly, and Williamson county with its present boundaries was established February 28, 1839, by legislative act. It was named after a county in Tennessee.

According to U. S. Census data, the population of the county increased steadily until it reached 53,880 in 1930,

then declined to 48,621 in 1950 (Table 1). Herrin, Johnston City, and Carterville have followed essentially similar trends, but the population of Marion has continued to rise, reaching 10,459 in 1950.

**Transportation and industrial development.** Transportation facilities are well developed in Williamson county. At the present time the county has five Illinois

Table 1. — POPULATION OF WILLIAMSON COUNTY AND OF FOUR TOWNS IN THE COUNTY

County or town	1890	1910	1930	1940	1950
Williamson county.....	22 226	45 098	53 880	51 424	48 621
Marion.....	1 338	7 093	9 033	9 251	10 459
Herrin.....	.....	6 861	9 708	9 352	9 331
Johnston City.....	.....	3 248	5 955	5 418	4 479
Carterville.....	969	2 971	2 866	2 893	2 716



Table 2. — PERCENT OF LAND USED FOR VARIOUS CROPS AND FOR OTHER PURPOSES  
IN WILLIAMSON COUNTY, 1890-1954

Land use	1890	1910	1930	1940	1950	1954
	<i>percent of total acreage</i>					
Corn.....	16	18	11	8	9	10
Soybeans.....	..	..	1	2	4	4
Winter wheat.....	10	3	1	2	2	2
Oats.....	7	1	1	1	1	1
Tame hay.....	6	8	10	9	4	4
Woodland and other unimproved land.....	..	13	8	7	6	6
Pasture and other land in farms.....	..	36	39	33	32	25
Land not in farms.....	16	21	29	38	42	48

state highways and one U. S. highway, and numerous concrete pavements connect towns in the northern coal-mining section. Most of the township roads in all parts of the county are graveled.

Several railroads, the Chicago and Eastern Illinois, the Illinois Central, the New York Central, the Chicago, Burlington, and Quincy, and the Missouri and Pacific, have through lines in the county.

Air transportation is available through the Williamson County Airport located south of Herrin and west of Marion.

Many industries, both large and small, are located in the county (2). Coal mining has been the largest single industry since 1810. The Illinois Ordnance Plant on Crab Orchard lake, a shell-loading plant during World War II, has been developed into an industrial community under the supervision of the U. S. Department of the Interior. Among the industries in this area are a foundry, a paint-mixing plant, and factories for the manufacture of electronic products, furniture, farm equipment, and chemical fertilizers. Marion and Herrin also have sizable industries of their own.

A large labor force, good transportation, the water resources of Crab Orchard, Little Grass, and Devil's Kitchen lakes, and coal are among the major attractions of Williamson county to industry.

**Agriculture.** Agriculture has been important in Williamson county from the first, although the percentage of land in farms steadily decreased from 84 percent in 1890 to 58 percent in 1950. In 1950 there were 2,057 farms with an average size of 78 acres and 9.4 percent tenancy. Average size of farms in 1890 was 87 acres. Census data for 1954 show 1,319 farms with an average size of 109 acres and 7.2 percent tenancy. The average size of farms is relatively small because many are operated by part-time farmers.

The percentages of land in Williamson county used for various crops and for other purposes are given in Table 2. From 1890 to 1950 the percentages of land in the various crops except soybeans decreased. By 1954 pasture and other land in farms had decreased 7 percentage points from 1950, and land not in farms had increased 6 percentage points.

Livestock and chicken numbers on Williamson county farms for various years are given in Table 3. Swine numbers were at a peak in 1890 and lowest in 1930 and 1940, with a marked rise in 1950. Sheep numbers gradually declined from 6,131 in 1890 to 1,046 in 1950. Cattle numbers have not changed greatly, whereas horse and mule numbers have dropped considerably since 1910. The number of chickens was at a peak in 1890 and lowest in 1940.

Since about 1940 a notable trend to

Table 3. — LIVESTOCK AND CHICKEN POPULATION IN WILLIAMSON COUNTY, 1890-1950

Kind of animal	1890	1910	1930	1940	1950
Swine.....	39 747	16 976	9 929	9 951	14 102
Sheep.....	6 131	2 446	1 725	1 271	1 046
Dairy cattle.....	5 012	5 025	6 279	4 833	4 164
Beef cattle.....	7 211	6 406	7 937	9 416	7 748
Horses and mules.....	8 528	10 302	6 550	5 076	3 200
Chickens.....	271 938	127 801	149 477	97 161	101 411

improved grassland farming has been taking place in Southern Illinois. Both the University of Illinois Agricultural Experiment Station and the U. S. Department of Agriculture have been instrumental in the promotion of better farming in this area. In 1940 the University of Illinois assumed full direction of the Dixon Springs Experiment Station (14) located in Pope county about 20 miles southeast of Williamson county. On this station various methods of grassland farming, involving mainly pasture and livestock management, are being

developed and demonstrated (Figure 7). A large number of farmers from Illinois and adjacent states visit the Dixon Springs Station each year, and many in Williamson county as well as in other counties have adopted practices proven at the station.

While there has been a trend to improved grassland farming in Williamson county, a much greater shift in that direction is needed. Many of the soils of the county are better adapted, in general, to this type of agriculture than to any other.



Sheep grazing on birdsfoot trefoil at the Dixon Springs Experiment Station, located in Pope county not far from Williamson county. (Fig. 7)

## DESCRIPTION OF WILLIAMSON COUNTY SOILS

On the following pages will be found a description of each soil type in Williamson county, including general occurrence, formation, relationship to other soils, and detailed profile characteristics.

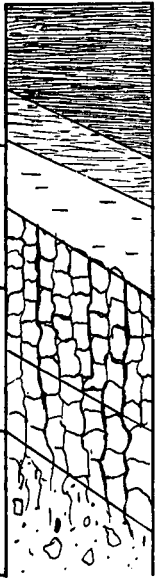
The profile characteristics are shown by means of (1) a generalized drawing and (2) a description of a representative specific profile. The drawings show the major horizons. Slanting lines between horizons indicate the main variations in thickness. The drawings do not, however, indicate all detailed variations that

may be found in a soil type. In the profile descriptions, the horizons are designated by letters, as discussed on page 5. Thicknesses of the A horizons are for areas that have not been seriously eroded. Munsell color notations<sup>1</sup> and consistence are for moist soils.

The soil types are in numerical order, as they are also in Table 4, pages 14 and 15, which shows the area of each type in the county. Table 4 also shows the area of each soil mapping unit (combination of soil type, slope, and erosion).

### Cisne silt loam (2)

Cisne silt loam is a dark to very dark grayish-brown upland soil developed under native grass on slopes of less than 1½ percent. The loess from which Cisne developed is underlain by weathered Illinoian till, usually at depths of less than 65

Generalized profile	Description of representative profile, Cisne silt loam	
	A <sub>1</sub> (0-9")	Dark to very dark grayish-brown (10YR 4/2-3/2) friable silt loam with weak, fine crumb structure. pH 5.2.
	A <sub>2-1</sub> (9-12")	Grayish-brown (10YR 5/2) friable silt loam with weak crumb structure. pH 5.0.
	A <sub>2-2</sub> (12-18")	Light gray (10YR 7/2) friable silt loam with weak crumb to platy structure. pH 4.7.
	B <sub>2</sub> (18-30")	Gray (10YR 6/1) to light brownish-gray (10YR 6/2) very firm silty clay loam to silty clay mottled with yellowish-brown (10YR 5/6). Blocky structure arranged in prismatic form. pH 4.8.
	B <sub>3</sub> (30-40")	Grayish-brown (10YR 5/2), mottled with yellowish-brown (10YR 5/8), very firm silty clay loam with weak blocky structure. pH 5.2.
4 FT.	D (40"+)	Grayish-brown (10YR 5/2) firm silty clay loam to clay loam weathered Illinoian till.

<sup>1</sup> These notations refer to soil color standards developed by the Munsell Color Company, Inc. The notations consist of three variables: hue, value, and chroma. In the notation 10YR 4/2, for example, the hue is denoted by the 10YR (YR=yellow-red), the value by the 4, and the chroma by the 2. Hue is the dominant spectral (rainbow) color and is related to the dominant wave length of the light. Value refers to the relative lightness of color and is a function of the total amount of light. Chroma is the relative purity or strength of the spectral color.

Table 4. — WILLIAMSON COUNTY SOILS: Areas of the Different Types Grouped

Type No.	Type name	Percent of total area	Area in square miles	Area in acres	Acres of various		
					Erosion group	A slope 0-1.5%	B slope 1.5-4%
2	Cisne silt loam.....	.83	3.66	2 339	None to slight	2 339	.....
3	Hoyleton silt loam.....	1.74	7.69	4 915	None to slight Moderate	402	4 248 196
4	Richview silt loam.....	.28	1.26	804	Severe None to slight Moderate	.....	..... 156 16
5	Blair silt loam.....	.61	2.70	1 725	Severe None to slight Moderate	.....	.....
8	Hickory loam.....	.46	2.05	1 306	Severe Moderate	.....	.....
8-14	Hickory loam-Ava silt loam, complex.....	6.73	29.70	19 002	Severe	.....	.....
8-214	Hickory loam-Hosmer silt loam, complex....	1.08	4.78	3 060	Moderate Severe	.....	.....
9	Steep rocky land, sandstone material.....	.41	1.81	1 151	Moderate Severe	.....	.....
11	Loy silt loam.....	.05	.23	143	None to slight	143	.....
12	Wynoose silt loam.....	1.85	8.18	5 231	None to slight	5 231	.....
13	Bluford silt loam.....	7.05	31.10	19 899	None to slight Moderate	1 361	18 217 321
14	Ava silt loam.....	19.80	87.24	55 843	None to slight Moderate Severe	.....	15 874 151
70	Beaucoup silty clay loam	1.25	5.51	3 518	None to slight	3 518	.....
71	Darwin clay.....	.32	1.43	917	None to slight	917	.....
72	Sharon silt loam.....	2.85	12.58	8 047	None to slight	8 047	.....
84	Okaw silt loam.....	.92	4.08	2 609	None to slight Moderate	532	20 13
85	Jacob clay.....	.05	.20	132	None to slight	132	.....
108	Bonnie silt loam.....	2.44	10.77	6 891	Mine wash	45	.....
109	Racoon silt loam.....	.19	.86	548	None to slight	6 846	.....
122	Colp silt loam.....	1.51	6.65	4 261	None to slight Moderate Severe	548	989 180

Table 4. — Concluded

Type No.	Type name	Percent of total area	Area in square miles	Area in acres	Acres of various		
					Erosion group	A slope 0-1.5%	B slope 1.5-4%
132	Starks silt loam.....	.11	.50	318	None to slight	318	.....
134	Camden silt loam.....	.15	.64	416	None to slight Moderate	5	222
164	Stoy silt loam.....	3.12	13.75	8 800	Severe None to slight Moderate	299	7 885
165	Weir silt loam.....	.76	3.34	2 139	Severe None to slight	31	.....
167	Lukin silt loam.....	.04	.17	110	None to slight	2 139	.....
176	Marissa silt loam.....	.07	.32	201	None to slight	33	77
214	Hosmer silt loam.....	11.61	51.14	32 742	None to slight Moderate	143	58
287	Chauncey silt loam.....	.02	.08	56	None to slight	.....	6 911
288	Petrolia silty clay loam...	.10	.44	282	Severe Silty deposition	.....	24
301	Grantsburg silt loam....	3.12	13.74	8 800	None to slight Moderate	255	1 708
335	Robbs silt loam.....	.11	.49	317	Severe None to slight	.....	.....
337	Creal silt loam.....	.34	1.51	966	None to slight	31	286
338	Hurst silt loam.....	2.12	9.38	5 998	None to slight	127	839
339	Wellston silt loam.....	5.34	23.55	15 079	None to slight Moderate	5 998	.....
340	Manitou silt loam.....	4.99	21.99	14 077	Moderate Severe	.....	.....
382	Belknap silt loam.....	12.30	54.20	34 692	Moderate Severe	.....	.....
	Borrow pit, mine dump and surface mine.....	1.92	8.48	5 427	Mine wash	322	.....
	Water.....	3.36	14.80	9 479	None to slight	34 370	.....
	<b>TOTAL.....</b>	<b>100.00</b>	<b>441.00</b>	<b>282 240</b>		<b>76 228</b>	<b>58 422</b>
	<b>Area of each erosion and slope group</b>						
	Silty deposition and mine wash.....	14	.62	394	Silty deposition and mine wash	394	.....
	None to slight.....	52.32	230.72	147 656	None to slight	78 790	57 490
	Moderate.....	15.66	69.06	44 194	Moderate	2 044	932
	Severe.....	26.60	117.32	75 090	Severe	.....	.....



Table 5. — CHEMICAL ANALYSES AND PARTICLE SIZE DISTRIBUTION OF CISNE SILT LOAM<sup>a</sup>

Horizon	Depth	pH	Or- ganic car- bon <sup>b</sup>	Exchangeable cations <sup>c</sup>			Cation ex- change capac- ity	Base satura- tion	Particle size distribution		
				Ca	Mg	K			Sand 2-.05 mm.	Silt .05-.002 mm.	Clay <sup>d</sup> <.002 mm.
	<i>in.</i>		<i>pct.</i>	<i>me./ 100 gm.</i>	<i>me./ 100 gm.</i>	<i>me./ 100 gm.</i>	<i>me./ 100 gm.</i>	<i>pct.</i>	<i>pct.</i>	<i>pct.</i>	<i>pct.</i>
A <sub>1</sub> .....	0-8	4.4	1.5	2.6	0.2	...	10.7	28	5.6	76.7	17.7
A <sub>2-1</sub> .....	8-14	4.1	.8	1.7	0.2	...	8.2	16	6.2	75.7	18.1
A <sub>2-2</sub> .....	14-21	4.3	.3	1.1	0.2	...	7.0	17	9.4	76.0	14.6
B <sub>2-1</sub> .....	21-31	4.4	.5	6.6	4.0	...	28.3	39	2.8	51.2	46.0
B <sub>2-2</sub> .....	31-38	4.6	.4	7.5	5.0	...	28.8	41	3.5	54.6	41.9
B <sub>3-1</sub> .....	38-46	4.8	.2	7.8	5.1	...	24.3	55	5.9	60.6	33.5
B <sub>3-2</sub> .....	46-53	5.0	.2	8.5	5.2	...	20.7	69	5.6	63.8	30.6
C <sub>1</sub> .....	53-56	5.2	.2	9.1	5.3	...	20.0	78	5.9	66.5	27.6
D.....	56+	...	...	...	...	...	...	...	...	...	...

<sup>a</sup> Profile sampled in Fayette county. Township 7 north, Range 1 east, Section 4, northeast  $\frac{1}{4}$ , northeast 40 acres, northeast 10 acres.

<sup>b</sup> Percent organic carbon times 1.724 = percent organic matter.

<sup>c</sup> One me. of Ca (calcium) per 100 gms. soil = 400 pounds per acre or per 2 million pounds soil. One me. of Mg (magnesium) per 100 gms. soil = 240 pounds per acre or per 2 million pounds soil.

<sup>d</sup> Clay <.002 mm. interpolated between <.005 and <.001 mm.

inches. Cisne, a poorly drained soil, occurs in association with Hoyleton (3), an imperfectly drained soil, and Richview (4), a moderately well-drained soil. Hoyleton and Richview occur on more sloping areas than Cisne.

Since Cisne is a nearly level claypan soil (Figure 20, page 61) in which tile do not function properly, drainage is usually provided by means of surface ditches or dead furrows. Cisne is strongly acid and low in plant nutrients. However, it responds well to soil treatment and good soil management (see Tables 20 and 21, pages 65 and 66). Conventional fertilization of Cisne has been found to markedly increase root penetration of corn (3). This permits the corn plant to draw upon a much larger volume of soil for nutrients and water.

Cisne is used mainly for corn, soybean, wheat, and hay production.

### Hoyleton silt loam (3)

Hoyleton silt loam is a dark to very dark grayish-brown, imperfectly drained, upland soil developed under grass from less than 65 inches of loess over weathered Illinoian till. Slopes range from 1 to 7 percent. Hoyleton is intermediate in many characteristics between Cisne (2) and Richview (4), two soils with which it is commonly associated.

Some chemical and physical properties of Hoyleton silt loam are given in Table 6. The thinness of the A<sub>1p</sub> and shallow depth (11 inches) to the B horizon indicate that the profile described in this table probably was somewhat eroded.

Hoyleton usually has enough slope for good surface drainage. Many of the more sloping areas have a serious erosion problem. Hoyleton is strongly acid and low in plant nutrients. It has less clay in the B horizon than Cisne and probably should respond even more than Cisne to good soil management (see Tables 20 and 21, pages 65 and 66). It is used primarily for corn, soybeans, wheat, and hay.

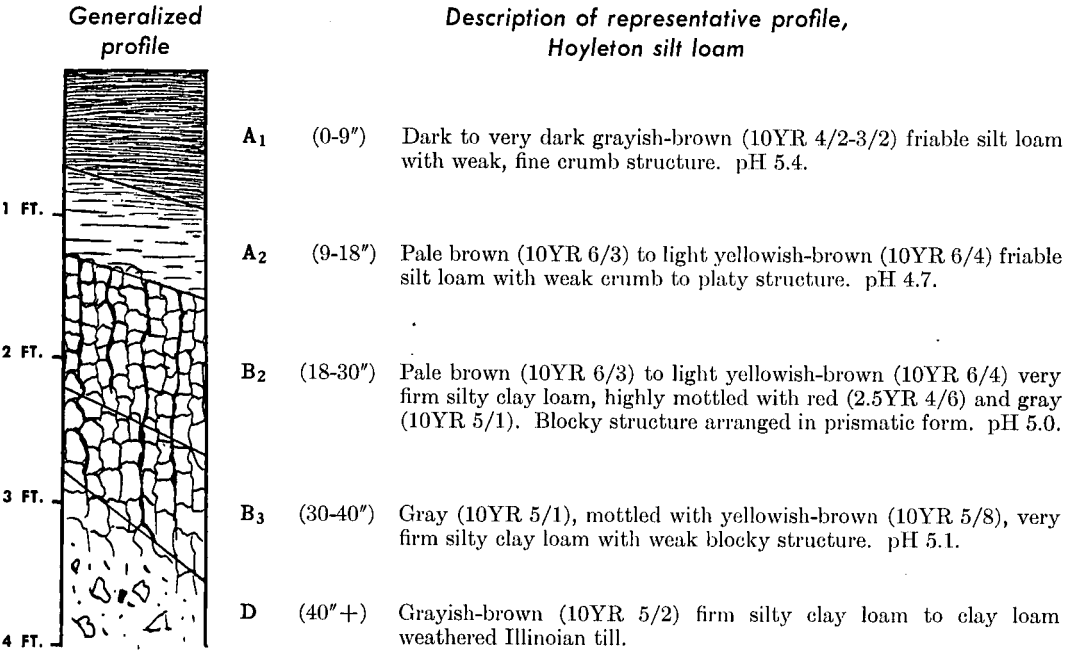


Table 6. — CHEMICAL ANALYSES AND PARTICLE SIZE DISTRIBUTION OF HOYLETON SILT LOAM<sup>a</sup>

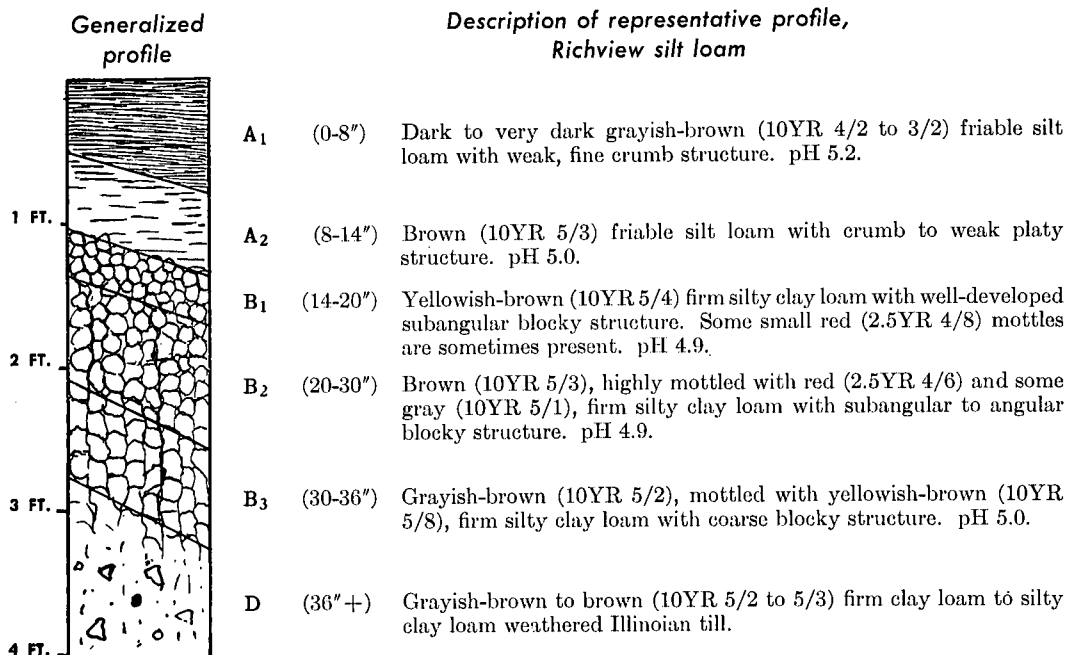
Horizon	Depth	Cation exchange capacity	Base saturation	Particle size distribution			Fine clay <.0002 mm.
				Sand 2-.05 mm.	Silt .05-.002 mm.	Clay <.002 mm.	
	<i>in.</i>	<i>me./100 gm.</i>	<i>pct.</i>	<i>pct.</i>	<i>pct.</i>	<i>pct.</i>	<i>pct.</i>
A <sub>1p</sub> .....	0-6	15.2	26	10.2	70.2	19.6	12.7
A <sub>2</sub> .....	6-11	15.1	31	6.0	72.9	21.1	12.8
B <sub>2</sub> .....	11-30	23.7	50	2.6	59.4	38.0	26.4
B <sub>3</sub> .....	30-38	18.9	76	5.0	65.4	29.6	20.7
D.....	38-45	10.4	84	30.5	51.6	17.9	13.6

<sup>a</sup> Profile sampled in Shelby county. Township 9 north, Range 5 east, Section 18, northeast ¼, northwest 40 acres, northeast 10 acres.

Richview silt loam (4)

Richview silt loam is a dark to very dark grayish-brown upland soil found in association with Cisne (2) and Hoyleton (3) soils. It occurs on slopes ranging from about 3 to 7 percent, and has developed under grass vegetation from less than 65 inches of loess over weathered Illinoian till. Richview is moderately well drained. (A profile description and Table 7, giving some chemical and physical properties, are on page 18.)

Although Richview is a highly weathered soil, it does not have a pronounced claypan as does Cisne (Figure 20, page 61). It responds well to good soil management, but in general, because of steeper slopes and greater erosion, it is not quite as well adapted to grain production as Hoyleton.



**Table 7. — CHEMICAL ANALYSES AND PARTICLE SIZE DISTRIBUTION  
OF RICHVIEW SILT LOAM<sup>a</sup>**

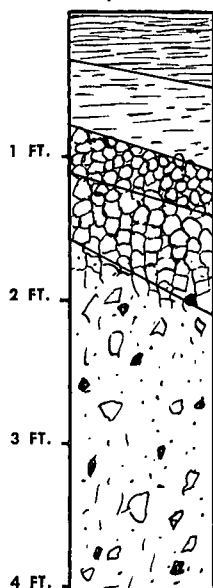
Horizon	Depth	Cation exchange capacity	Base satura- tion	Particle size distribution			Fine clay <.0002 mm.
				Sand 2-.05 mm.	Silt .05-.002 mm.	Clay <.002 mm.	
	<i>in.</i>	<i>me./100 gm.</i>	<i>pct.</i>	<i>pct.</i>	<i>pct.</i>	<i>pct.</i>	<i>pct.</i>
A <sub>1</sub> .....	0-6	12.4	61	8.8	73.7	17.5	9.5
A <sub>2</sub> .....	6-13	11.5	63	6.6	72.7	20.7	11.2
B <sub>1</sub> .....	13-18	15.6	49	2.4	70.8	26.8	16.4
B <sub>2</sub> .....	18-24	22.2	39	1.0	62.8	36.2	26.7
B <sub>3</sub> .....	24-31	17.6	41	4.1	64.3	31.6	23.0
D.....	31-40	14.0	35	17.1	60.6	22.3	15.7

<sup>a</sup> Profile sampled in Shelby county. Township 9 north, Range 5 east, Section 8, southeast  $\frac{1}{4}$ , southwest 40 acres, southeast 10 acres.

### Blair silt loam (5)

Blair silt loam is a light-colored, upland soil found on slopes of 4 to 12 percent. It developed under forest vegetation from less than 24 inches of loess over leached Illinoian till. Blair is imperfectly drained and occurs in association with Bluford (13), Ava (14), and Hickory (8) soils. Most areas of Blair have been moderately to severely eroded, and therefore may have a thinner A horizon than indicated in the description of a representative profile on page 19.

The upper layers of Blair are strongly acid, low in available phosphorus, and low to medium in available potassium, unless they have had soil treatment. The weathered glacial till in the lower part of the profile, however, is often high in

Generalized  
profileDescription of representative profile,  
Blair silt loam

- |                      |          |   |
|----------------------|----------|---|
| <b>A<sub>p</sub></b> | (0-5")   | Dark grayish-brown (10YR 4/2) to brown (10YR 5/3) friable silt loam with weak crumb structure. pH 4.8.  |
| <b>A<sub>2</sub></b> | (5-11")  | Pale brown (10YR 6/3) friable silt loam with platy structure. pH 4.7.   |
| <b>B<sub>1</sub></b> | (11-14") | Pale brown (10YR 6/3), mottled with light gray (10YR 7/2), firm silty clay loam with fine subangular blocky structure. pH 4.7.  |
| <b>B<sub>2</sub></b> | (14-22") | Pale brown (10YR 6/3) to light yellowish-brown (10YR 6/4), mottled with light gray (10YR 7/2) and yellowish-brown (10YR 5/8), firm silty clay loam to clay loam with blocky to subangular blocky structure. pH 4.8. |
| <b>D</b>             | (22-48") | Mottled light gray (10YR 7/2) and brown (10YR 5/3) firm clay loam till. pH 4.8.   |

available potassium. Because Blair is highly weathered and occurs on sloping land, the main problems on this soil are improving fertility and controlling erosion. Blair is better adapted for hay and pasture production than for grain crops. Some of the least sloping and least eroded areas may be used for grain production if conservation practices such as contouring, strip cropping, or terracing are followed.

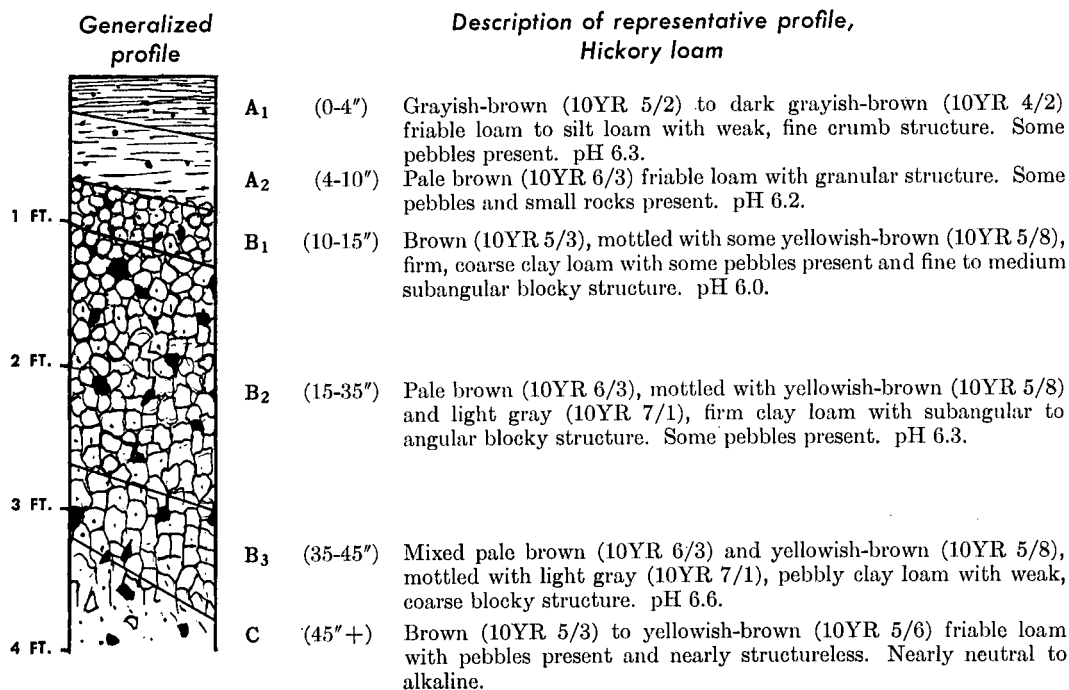


When properly managed, the less steep areas of Hickory loam (described on next page) produce good pasture. (Fig. 8)

## Hickory loam (8)

Hickory loam is a light-colored upland soil developed under forest vegetation on slopes ranging from 10 to over 30 percent. The parent material is mainly Illinoian till. Some of the less sloping areas had a thin loess cover, but it is doubtful if the steeper areas have been influenced by loess.

Hickory loam, besides occurring alone in mappable areas in Williamson county, also occurs in a complex with Ava silt loam in areas marked 8-14 on the soil map. It also occurs with Hosmer in a similar complex (8-214 on the map). The profile drawing and description below are from uncultivated, relatively uneroded areas. Because of erosion, the A horizon is nearly always absent in areas that have been cleared and cultivated for a number of years.



Since Hickory occurs on steep slopes, erosion is generally a serious problem. On the steepest slopes Hickory is better adapted to forest than to anything else. North slopes produce the most timber since they are cooler and moister than south slopes. Many areas of Hickory that have been cleared and are seriously eroded should be reforested to shortleaf and loblolly pine. Hickory is moderately well drained in Williamson county, and where eroded, the remaining portion is about a clay loam in texture. Pine trees make reasonably good growth under such conditions.

Some of the least sloping areas produce reasonably good pasture following proper soil treatment (Figure 8). Hickory varies from strongly to slightly acid, and usually is low in available phosphorus and medium to high in available potassium.



### Hickory loam — Ava silt loam complex (8-14)

In areas marked 8-14 on the soil map Hickory loam and Ava silt loam are so intermingled that they could not be shown separately on a small-scale map. Both Hickory and Ava are light-colored soils developed under forest. The Hickory-Ava complex occurs on slopes ranging from about 8 to 30 percent in Williamson county. Ava usually occupies the upper one-fourth to one-half of a slope, and Hickory occupies the lower portion, where weathered Illinoian glacial till rather than loess is present.

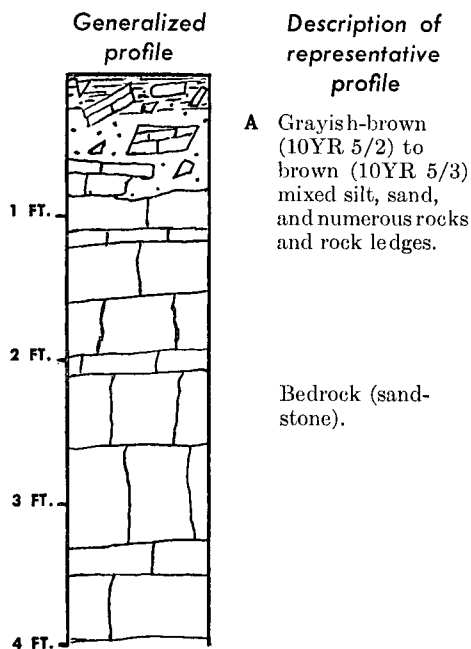
### Hickory loam — Hosmer silt loam complex (8-214)

In some areas Hickory loam and Hosmer silt loam are too intermingled to be shown separately on the soil map and are indicated as 8-214. The Hickory-Hosmer complex usually occurs on slopes between 8 and 30 percent, but a few areas are on steeper slopes. Hosmer usually occupies the upper third to half of a slope; and Hickory, the lower portion, where the parent material is glacial till rather than loess.

Like Hickory, Hosmer is a light-colored soil developed under forest.

### Steep rocky land, sandstone material (9)

Steep rocky land, sandstone material occurs on very steep slopes. This land type is a mixture of sand, silt, and numerous rocks, and outcrops of sandstone bedrock are common (Figure 9). Little soil development is evident in most areas. On areas having about 10 inches of soil material above the bedrock, however, some soil development, including a weak B horizon, can be detected. On such areas, the soil material is approaching Wellston silt loam (339). Steep rocky land should be used for forest or wild life. Timber management may be used to advantage in some areas, but at best, tree growth is slow on this land type.



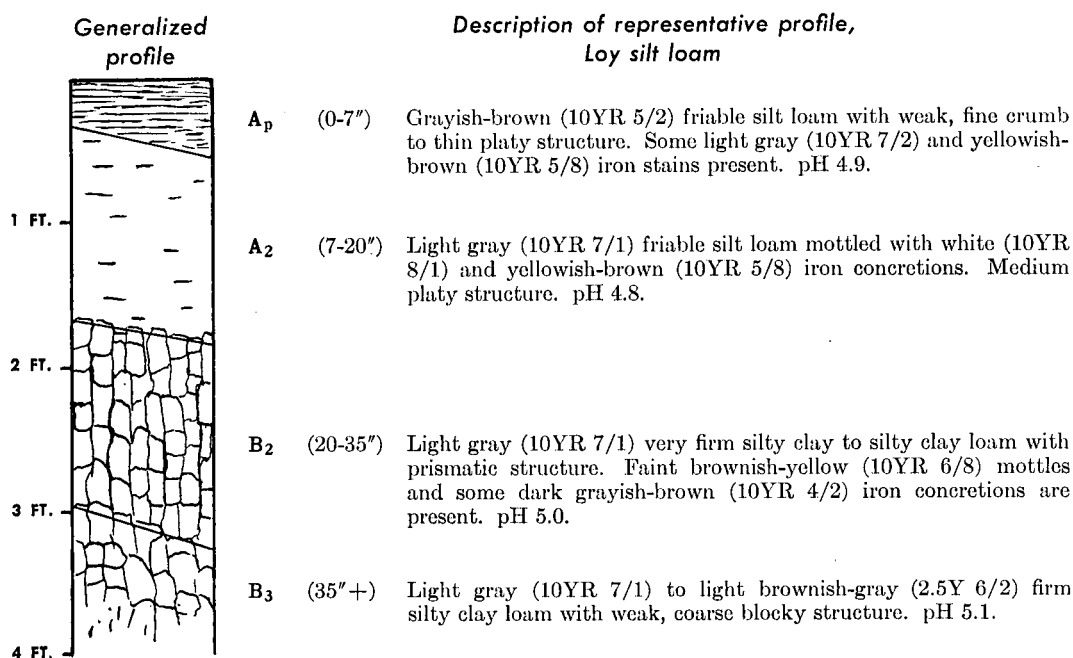
An area of steep rocky land with sandstone outcropping in the background. (Fig. 9)

### Loy silt loam (11)

Loy silt loam is a light-colored upland soil found on very flat land or in slight depressions. It has developed under forest vegetation from less than 65 inches of loess over weathered Illinoian till. Loy is very poorly drained and occurs in association with the poorly drained Wynoose (12), imperfectly drained Bluford (13), and the moderately well-drained Ava (14) soils.

Drainage is a difficult problem on this soil. The claypan profile is very slowly permeable to water, and the only way to remove excess water is with surface ditches. Yet many areas do not have sufficient fall for surface ditches to adequately remove excess water during very wet periods. Providing fertility is also a problem. Loy is strongly acid and low in available phosphorus and available potassium.

This soil is best suited for pasture and hay crops unless adequate drainage can be provided.



### Wynoose silt loam (12)

Wynoose silt loam is a poorly drained upland soil developed from less than 65 inches of loess over weathered Illinoian till. It is a light-colored soil, having developed under forest vegetation, and occurs on slopes of less than 1½ percent. Wynoose is associated with Loy (11), Bluford (12), and Ava (14) soils.

Wynoose is used for corn, soybeans, wheat, and hay. Before these crops can be grown successfully, however, this claypan soil must be drained with surface ditches, and large amounts of limestone and fertilizer must be applied. Wynoose is strongly acid and low in available phosphorus and available potassium. Because the surface soil is low in organic matter, maintaining good physical condition is also a problem.

Some chemical and physical properties of Wynoose are given in Figure 21, page 62, as well as in Table 8.

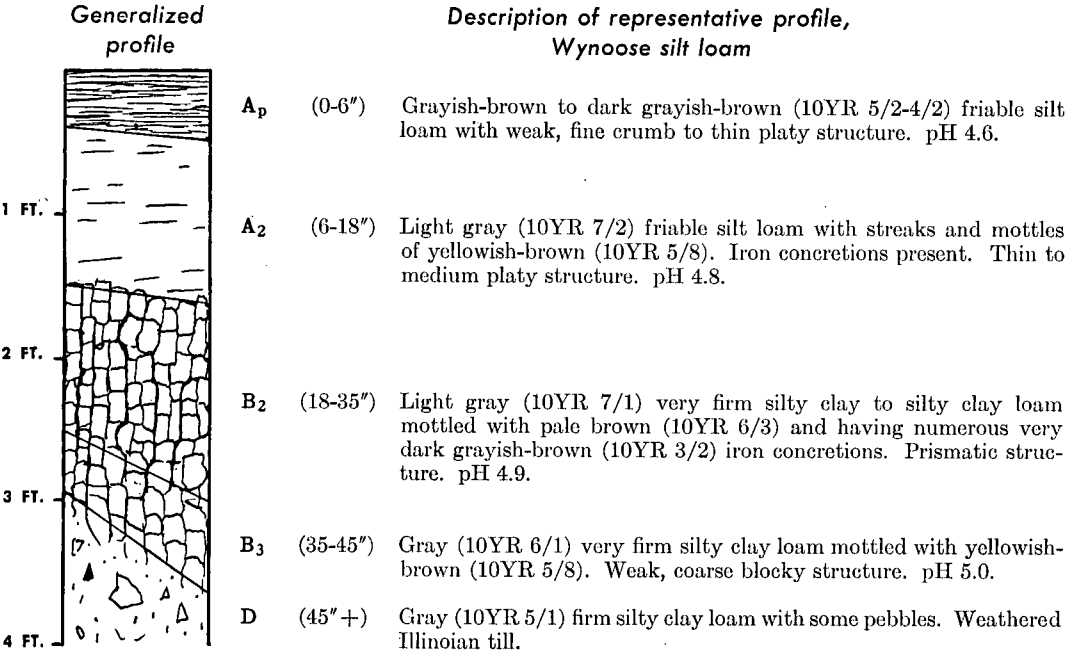


Table 8. — CHEMICAL ANALYSES AND PARTICLE SIZE DISTRIBUTION  
OF WYNOOSE SILT LOAM<sup>a</sup>

Horizon	Depth <sup>b</sup>	pH	Organic carbon <sup>c</sup>	Cation exchange capacity	Base saturation	Particle size distribution		
						Sand 2-.05 mm.	Silt .05-.002 mm.	Clay <sup>d</sup> <.002 mm.
	<i>in.</i>		<i>pct.</i>	<i>me./100 gm.</i>	<i>pct.</i>	<i>pct.</i>	<i>pct.</i>	<i>pct.</i>
A <sub>1</sub> .....	0-4	4.4	1.28	9.5	28	4.7	80.5	14.8
A <sub>2</sub> .....	4-20	4.3	.40	10.0	17	3.6	79.0	17.4
B <sub>2</sub> .....	20-35	4.0	.23	30.8	29	1.4	52.3	46.3
B <sub>3</sub> .....	35-42	4.0	.14	20.6	33	4.0	67.2	28.8
D.....	42+	4.8	.13	....	..	6.8	71.4	21.8

<sup>a</sup> Profile sampled in Jefferson county. Township 1 south, Range 2 east, Section 10, northwest ¼, northeast 40 acres, northeast 10 acres.

<sup>b</sup> Complete thicknesses were not sampled in all horizons.

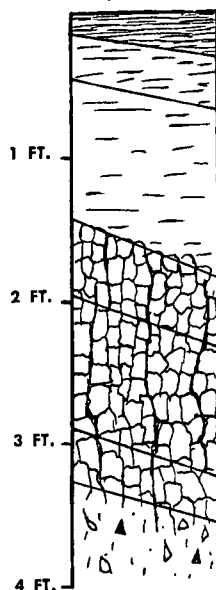
<sup>c</sup> Percent organic carbon times 1.724 = percent organic matter.

<sup>d</sup> Percent clay <.002 mm. interpolated between <.005 and <.001 mm.

Bluford silt loam (13)

Bluford silt loam is an upland soil, occurring on slopes ranging from about 1 to 4 percent. It has developed under forest vegetation from less than 65 inches of loess over weathered Illinoian till. Bluford is imperfectly drained and is intermediate in many characteristics between two soils associated with it — the poorly drained Wynoose (12) and the moderately well-drained Ava (14) silt loams.

Some chemical and physical properties of Bluford silt loam are given in Table 9. The samples were taken from the same profile described at the top of page 24, which was in a wooded area that had never been farmed.

Generalized  
profileDescription of representative profile,  
Bluford silt loam

A <sub>1</sub>	(0-3")	Dark grayish-brown (10YR 4/2) friable silt loam with weak, fine crumb structure. pH 4.5.
A <sub>2-1</sub>	(3-10")	Yellowish-brown (10YR 5/4) friable silt loam with crumb to weak platy structure. pH 4.4.
A <sub>2-2</sub>	(10-19")	Light yellowish-brown (10YR 6/4) friable silt loam with platy structure. pH 4.5.
B <sub>2-1</sub>	(19-25")	Light yellowish-brown (10YR 6/4) very firm silty clay loam with pale brown (10YR 6/3) coatings and yellowish-brown (10YR 5/6) iron stains. Prismatic structure breaking to medium blocky. pH 4.4.
B <sub>2-2</sub>	(25-35")	Grayish-brown (10YR-2.5Y 5/2) very firm silty clay to silty clay loam mottled with yellowish-brown (10YR 5/6). Prismatic structure breaking to coarse blocky. pH 4.3.
B <sub>3</sub>	(35-42")	Grayish-brown to light grayish-brown (10YR 5/2-6/2) very firm silty clay loam with coarse blocky structure. pH 4.4.
D	(42+)"	Grayish-brown (10YR 5/2) to brown (10YR 5/3) firm clay loam weathered Illinoian till.

Table 9. — CHEMICAL ANALYSES AND PARTICLE SIZE DISTRIBUTION  
OF BLUFORD SILT LOAM<sup>a</sup>

Horizon	Depth	pH	Or- ganic car- bon <sup>b</sup>	Exchangeable cations <sup>c</sup>			Cation ex- change capac- ity	Base satura- tion	Particle size distribution		
				Ca	Mg	K			Sand 2-.05 mm.	Silt .05-.002 mm.	Clay <.002 mm.
	in.		pct.	me./ 100 gm.	me./ 100 gm.	me./ 100 gm.	me./ 100 gm.	pct.	pct.	pct.	pct.
A <sub>1</sub> .....	0-3	4.5	1.8	.6	.6	.2	15.4	17	7.4	79.3	13.3
A <sub>2-1</sub> .....	3-10	4.4	.6	...	...	...	...	..	7.8	79.3	12.9
A <sub>2-2</sub> .....	10-19	4.5	.2	1.2	1.0	.2	12.3	21	6.9	74.8	18.3
B <sub>2-1</sub> .....	19-25	4.4	.2	...	...	...	...	..	3.3	57.6	39.1
B <sub>2-2</sub> .....	25-35	4.3	.2	5.0	5.8	.5	31.2	37	3.4	54.8	41.8
B <sub>3</sub> .....	35-42	4.4	.1	...	...	...	...	..	3.8	61.3	34.9

<sup>a</sup> Profile sampled in Williamson county. Township 8 south, Range 3 east, Section 35, northeast  $\frac{1}{4}$ , northeast 40 acres, southeast 10 acres.

<sup>b</sup> Percent organic carbon times 1.724 = percent organic matter.

<sup>c</sup> One me. of Ca (calcium) per 100 gm. soil = 400 pounds per acre or per 2 million pounds soil. One me. of Mg (magnesium) per 100 gm. soil = 240 pounds per acre or per 2 million pounds soil. One me. of K (potassium) per 100 gm. soil = 780 pounds per acre or per 2 million pounds soil.

Bluford is strongly acid and low in available phosphorus and available potassium. However, it responds well to good soil management, including proper soil treatment, and is used mostly for corn, soybean, wheat, and hay production. Bluford has enough slope that excess water can be removed easily with a few well-placed furrows. The more sloping areas have some erosion problems.

### Ava silt loam (14)

Ava silt loam is a light-colored, upland soil developed under forest vegetation from less than 65 inches of loess over leached Illinoian till. Where Ava occurs on uneroded ridgetops in Williamson county, loess thickness ranges from about 40 to 65 inches. On the steeper slopes into drainageways, loess thickness may be considerably less than 40 inches. Ava is the moderately well-drained member of the catena that

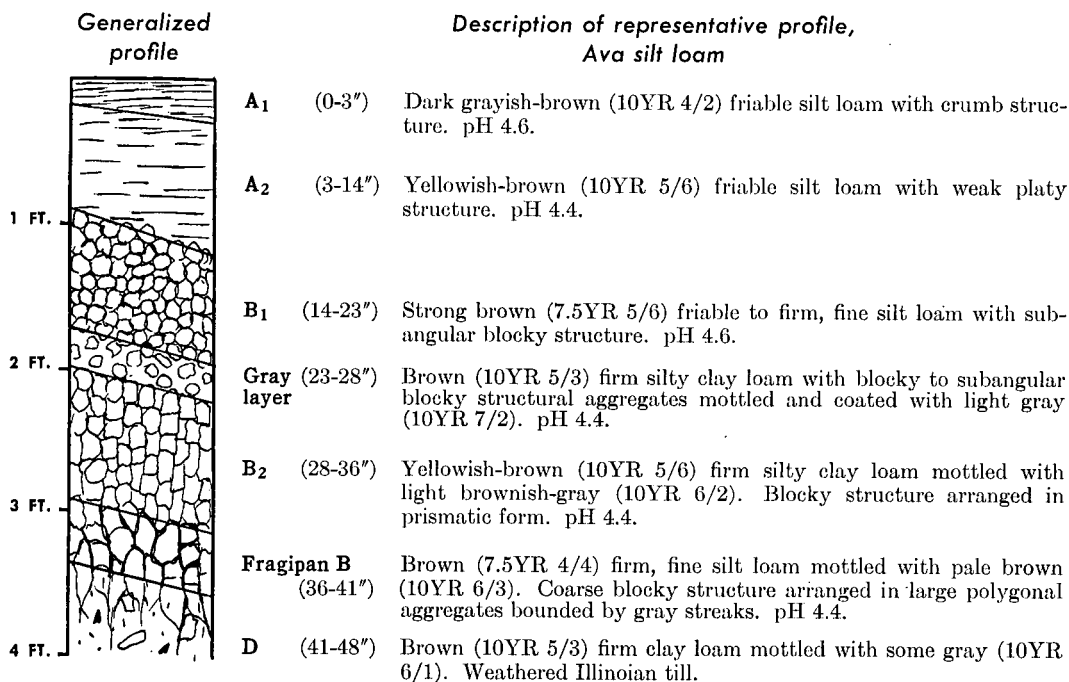


Table 10. — CHEMICAL ANALYSES AND PARTICLE SIZE DISTRIBUTION OF AVA SILT LOAM<sup>a</sup>

Horizon	Depth	pH	Or- ganic car- bon <sup>b</sup>	Exchangeable cations <sup>c</sup>			Cation ex- change capac- ity	Base satura- tion	Particle size distribution		
				Ca	Mg	K			Sand 2-.05 mm.	Silt .05-.002 mm.	Clay <.002 mm.
	in.		pct.	me./ 100 gm.	me./ 100 gm.	me./ 100 gm.	me./ 100 gm.	pct.	pct.	pct.	pct.
A <sub>1</sub> .....	0-4	4.6	1.20	1.3	.7	.3	13.2	18	2.5	82.8	14.7
A <sub>2</sub> .....	6-11	4.4	.17	...	...	...	...	..	2.1	80.3	17.6
B <sub>1</sub> .....	14-20	4.6	.02	.6	2.4	.2	16.3	20	2.1	73.6	24.3
Gray layer	23-28	4.4	.04	...	...	...	...	..	1.7	65.0	33.3
B <sub>2</sub> .....	30-36	4.4	.04	3.4	6.7	.4	28.3	38	1.4	63.8	34.8
Fragipan B	36-41	4.4	.03	...	...	...	...	..	1.5	71.8	26.7

<sup>a</sup> Profile sampled in Williamson county. Township 8 south, Range 3 east, Section 35, northeast  $\frac{1}{4}$ , northeast 40 acres, northeast 10 acres.

<sup>b</sup> Percent organic carbon times 1.724 = percent organic matter.

<sup>c</sup> One me. of Ca (calcium) per 100 gm. soil = 400 pounds per acre or per 2 million pounds soil. One me. of Mg (magnesium) per 100 gm. soil = 240 pounds per acre or per 2 million pounds soil. One me. of K (potassium) per 100 gm. soil = 780 pounds per acre or per 2 million pounds soil.

includes the very poorly drained Loy (11), the poorly drained Wynoose (12), and the imperfectly drained Bluford (13) soils.

Ava occurs on slopes of 2 to 18 percent. Many areas, especially on the steeper slopes, have been moderately to severely eroded.

In some areas of Williamson county Ava is so intermingled with Hickory loam (8) that the two could not be shown separately on the small-scale soil map. These complex areas are marked 8-14 on the map.

Ava is low in plant nutrients. Another problem is that the fragipan tends somewhat to restrict root penetration. Areas with slopes greater than 4 percent often are eroded. The more sloping and eroded areas should be used for hay, pasture, or timber production. Areas having slopes between 2 and 7 percent, if used for row crops, should be contoured, strip-cropped, or terraced.

### Beaucoup silty clay loam (70)

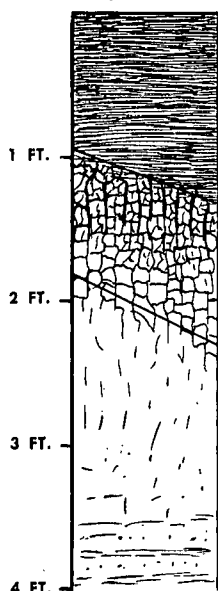
Beaucoup silty clay loam is a slightly acid to neutral, moderately dark-colored bottomland soil found on the flood plains of the Big Muddy river in northwestern Williamson county. Beaucoup is poorly to very poorly drained and is associated with Darwin clay (71). It occurs on slopes of less than  $1\frac{1}{2}$  percent.

Much of the Beaucoup in Williamson county is in timber. It is a productive soil for most farm crops if adequate drainage can be provided. Tile function slowly, and therefore open ditches are often the best means of removing excess water.

Beaucoup is low in available phosphorus and about medium in available potassium. Maintaining good physical condition in the surface soil is somewhat of a problem. The soil should be cultivated only when moisture conditions are favorable, and sod crops should be used in the rotation.

*Generalized  
profile*

*Description of representative profile,  
Beaucoup silty clay loam*



- |                |          |   |
|----------------|----------|---|
| A <sub>1</sub> | (0-14")  | Very dark gray (10YR 3/1) to dark gray (10YR 4/1) firm silty clay loam with granular to fine blocky structure. pH 6.0.                        |
| BC             | (14-30") | Gray (10YR 5/1) firm silty clay loam mottled with light gray (10YR 7/1) and yellowish-brown (10YR 5/8). Blocky to granular structure. pH 6.4. |
| C              | (30"+)   | Grayish-brown (10YR 5/2) firm silty clay loam with some soft, rusty iron concretions. pH 6.8.   |

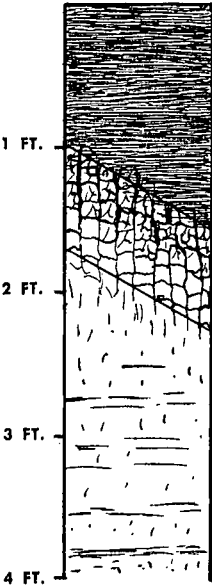
Darwin clay (71)

Darwin clay is a moderately dark-colored bottomland soil that occurs in association with Beaucoup silty clay loam (70) on the flood plains of Big Muddy river. It is a very fine-textured, very poorly drained soil.

Darwin clay is usually difficult to drain and farm. Water passes through it very slowly, making tile drainage impractical. Open ditches are commonly used to remove excess water, but sometimes it is difficult to obtain suitable outlets. Maintaining tilth in the surface soil is also a problem. Darwin is slightly acid to neutral in reaction, and about medium in available phosphorus and available potassium.

Generalized  
profile

Description of representative profile,  
Darwin clay



- A<sub>1</sub> (0-12") Very dark gray (10YR 3/1) to dark gray (10YR 4/1) very firm clay to silty clay with fine blocky to granular structure. pH 6.1.
- BC (12-24") Gray (10YR 5/1 to 6/1) very firm clay to silty clay mottled slightly with yellowish-brown (10YR 5/8). Weak, coarse blocky structure breaking to coarse granular in upper part. pH 6.3.
- C (24"+) Olive gray (5Y 5/2) very firm clay. Structureless. pH 6.5.

Swampy area of  
Darwin clay. Note  
duck blind in upper  
right of picture.  
(Fig. 10)



Table 11.—CHEMICAL ANALYSES AND PARTICLE SIZE DISTRIBUTION OF DARWIN CLAY<sup>a</sup>

Depth	pH	Organic carbon <sup>b</sup>	Exchangeable cations <sup>c</sup>			Cation exchange capacity	Base saturation	Particle size distribution		
			Ca	Mg	K			Sand 2-.05 mm.	Silt .05-.002 mm.	Clay <.002 mm.
<i>in.</i>		<i>pct.</i>	<i>me./100 gm.</i>	<i>me./100 gm.</i>	<i>me./100 gm.</i>	<i>me./100 gm.</i>	<i>pct.</i>	<i>pct.</i>	<i>pct.</i>	<i>pct.</i>
0-15.....	6.5	1.30	29.5	10.1	.6	47.0	88	.8	42.1	57.1
15-25.....	7.0	.92	30.2	11.6	.4	48.0	90	.6	41.4	58.0
25-32.....	7.4	.67	30.0	12.2	.4	46.5	94	.6	42.1	57.3
32-44.....	7.5	.52	29.7	12.5	.4	46.1	95	.6	42.6	56.8
44-55.....	7.8	.41	34.3	12.4	.4	49.6	98	.5	43.3	56.2

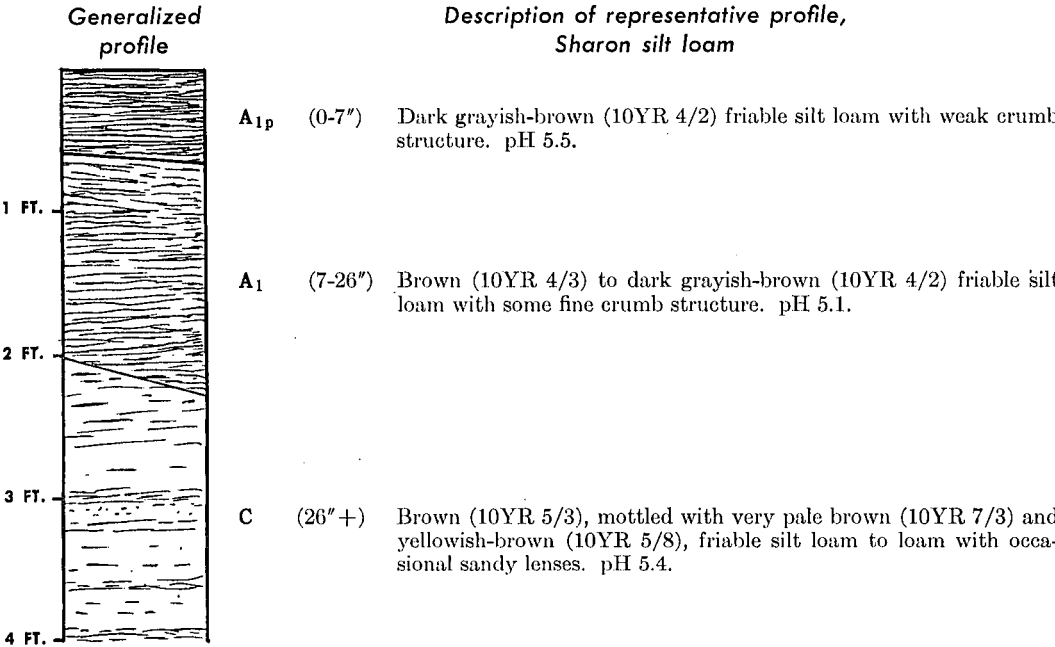
<sup>a</sup> Profile sampled in Lawrence county. Township 2 north, Range 12 west, Section 8, southwest ¼, northeast 40 acres, northeast 10 acres.  
<sup>b</sup> Percent organic carbon times 1.724 = percent organic matter.  
<sup>c</sup> One me. of Ca (calcium) per 100 gm. soil = 400 pounds per acre or per 2 million pounds soil. One me. of Mg (magnesium) per 100 gm. soil = 240 pounds per acre or per 2 million pounds soil. One me. of K (potassium) per 100 gm. soil = 780 pounds per acre or per 2 million pounds soil.

Some areas in which drainage can be provided without undue costs are used for corn and soybean production. Many areas, however, are used for pasture and hay. Very wet areas, such as most of those along the Big Muddy river, are used for timber production or wildlife (Figure 10).

Some chemical and physical properties of Darwin clay are given in Table 11 and in Figure 19, page 60.

Sharon silt loam (72)

Sharon silt loam is a light-colored soil found in small bottomlands in association with Belknap silt loam (382) and Bonnie silt loam (108). It has a thicker surface



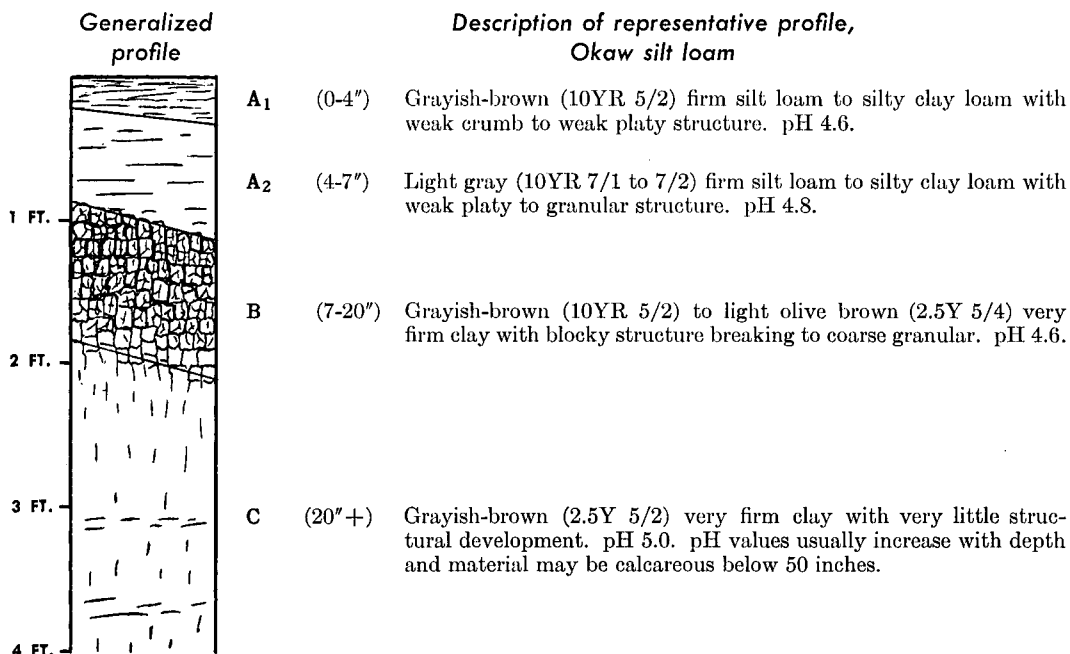


soil than Belknap or Bonnie and has better drainage, being moderately well-drained to well-drained. Sharon has formed in recent alluvium and does not show much soil development.

Where untreated, Sharon is medium acid, low in available phosphorus, and medium to low in available potassium. After proper treatment, it is a productive soil, and is used largely for corn and soybean production. In very small bottoms Sharon is often used for pasture.

### Okaw silt loam (84)

Okaw silt loam is a nearly level to depressional, light-colored, poorly to very poorly drained soil found on terraces along the Big Muddy river. In Williamson county it has developed under timber vegetation from less than 14 inches of silty material on Wisconsin-age, slack-water-deposited clays. It is associated with Hurst (338) and Colp (122) soils. Okaw differs from Hurst, principally, in having developed from less silty material and in being somewhat more poorly drained. It differs from Colp mainly in having poorer natural drainage.



Okaw is naturally low in productivity. It is strongly acid, low in available phosphorus, and low to medium in available potassium. It also has a very fine-textured B horizon, which has somewhat unfavorable moisture conditions for plants. Drainage is a problem. Tile do not function satisfactorily, so open ditches must be used.

Okaw is better adapted for small-grain crops and pasture than for row crops such as corn and soybeans. It will support fair growth of pin oak and gum trees (Figure 11).

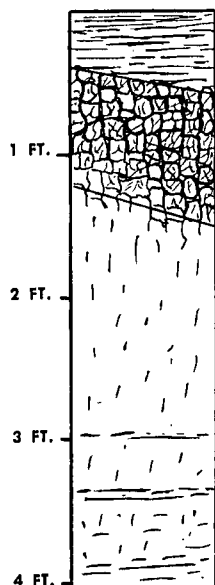


Pin oaks growing on Okaw silt loam. Okaw is not well suited to row crops, but may be used for small grains and pasture, as well as for pin oak and gum trees. (Fig. 11)

### Jacob clay (85)

Jacob clay is a very poorly drained, very fine-textured, light-colored soil found on flat, low-lying, or depressional bottomland areas. It is not an extensive soil type in Williamson county. Jacob occurs in association with Beaucoup (70) and Darwin (71) soils, along the Big Muddy river in the northwestern part of the county.

#### Generalized profile



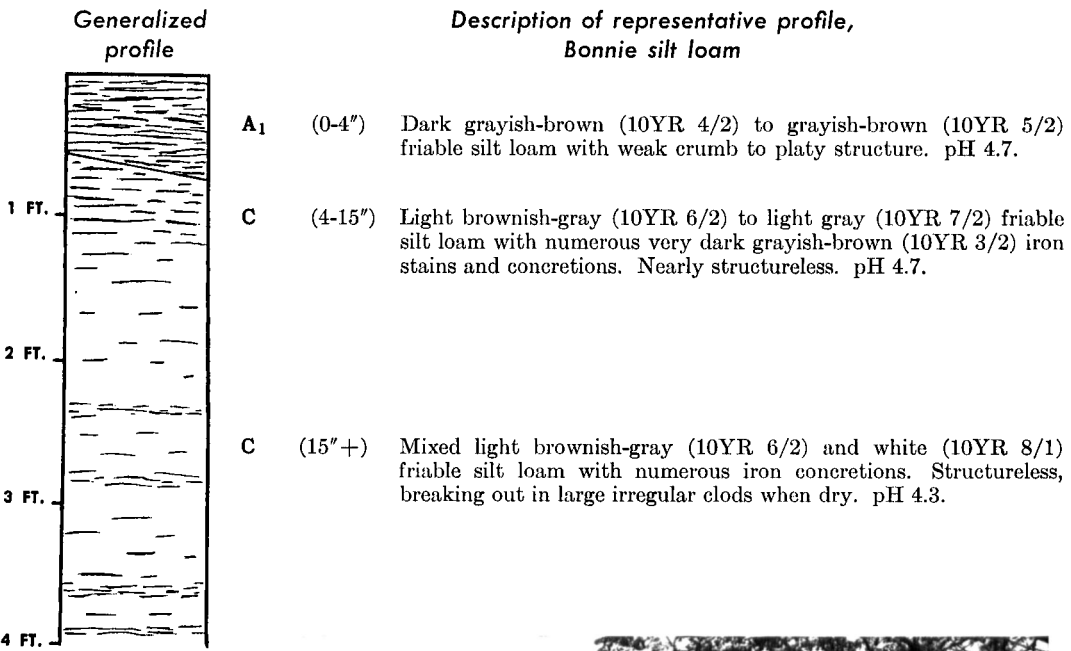
#### Description of representative profile, Jacob clay

- |                |         |   |
|----------------|---------|---|
| A <sub>1</sub> | (0-5")  | Dark gray (10YR 4/1) to gray (10YR 5/1) very firm clay to silty clay with weak granular structure. pH 4.9.  |
| BC             | (5-14") | Gray (10YR 6/1) to light gray (10YR 7/1) very firm clay with weak, medium blocky structure breaking to coarse granular. pH 4.4  |
| C              | (14"+)  | Gray (5Y 6/1) to light olive gray (5Y 6/2) very firm clay with some weak blocky structure, but for the most part nearly massive. pH 4.4 in upper part, but may become calcareous below 60 inches. |

Jacob clay is very difficult if not impossible to drain adequately. It is strongly acid, low in available phosphorus, and about medium in available potassium. Because of its adverse physical properties, soil treatment may not be profitable on this soil although there is very little information available on this point. Jacob is sometimes used for pasture but most areas are in trees, often pure stands of pin oak.

**Bonnie silt loam (108)**

Bonnie silt loam is a gray, poorly to very poorly drained soil found in low-lying bottomland areas that have had poor natural outlets. It occurs in association with the imperfectly drained Belknap (382) and the moderately well-drained to well-drained Sharon (72) soils. Besides being more poorly drained than Belknap and Sharon, Bonnie also has a thinner surface horizon (less than 8 inches thick). It has developed from light-colored, acid, medium-textured sediments.



A large improved pasture on Bonnie silt loam. Although Bonnie can be used for row crops if it is properly drained and fertilized, it is often better used for pasture or timber.

(Fig. 12)

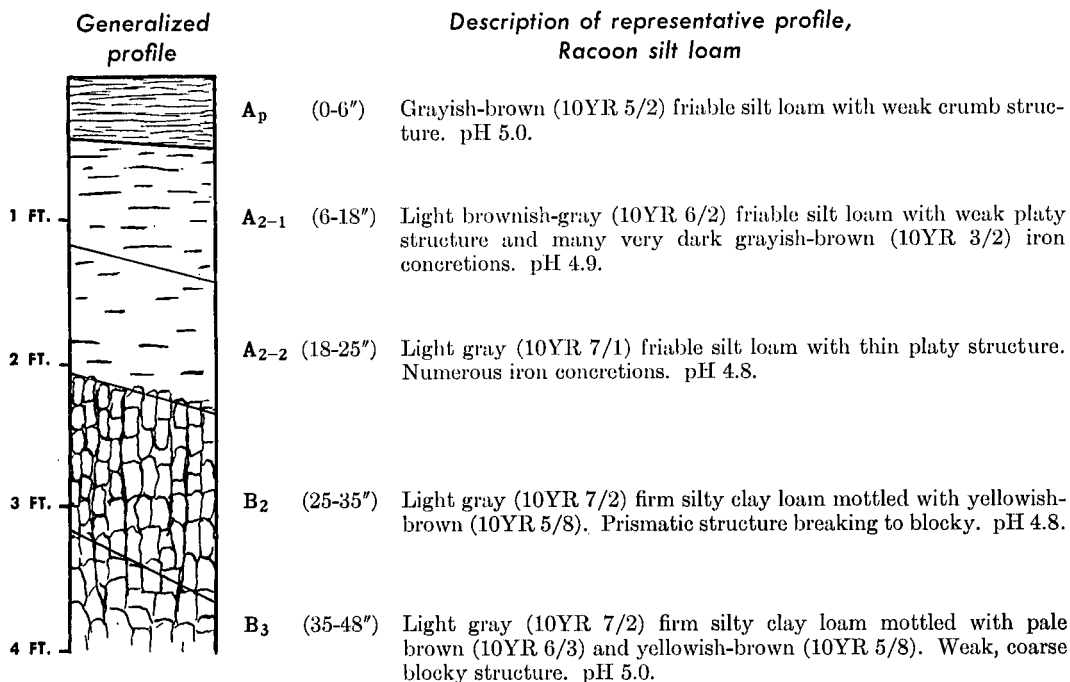


Bonnie is strongly acid and low in available phosphorus and available potassium. Besides having a fertility problem, Bonnie also has a drainage problem. Open ditches are commonly used to remove excess water since tile seldom function satisfactorily in this soil. Low organic-matter content of the surface soil makes the maintenance of good physical condition a problem. Bonnie, if adequately drained and fertilized, grows reasonably good crops of corn and soybeans. However, many areas are used for pasture and some areas are in timber (Figure 12).

### Raccoon silt loam (109)

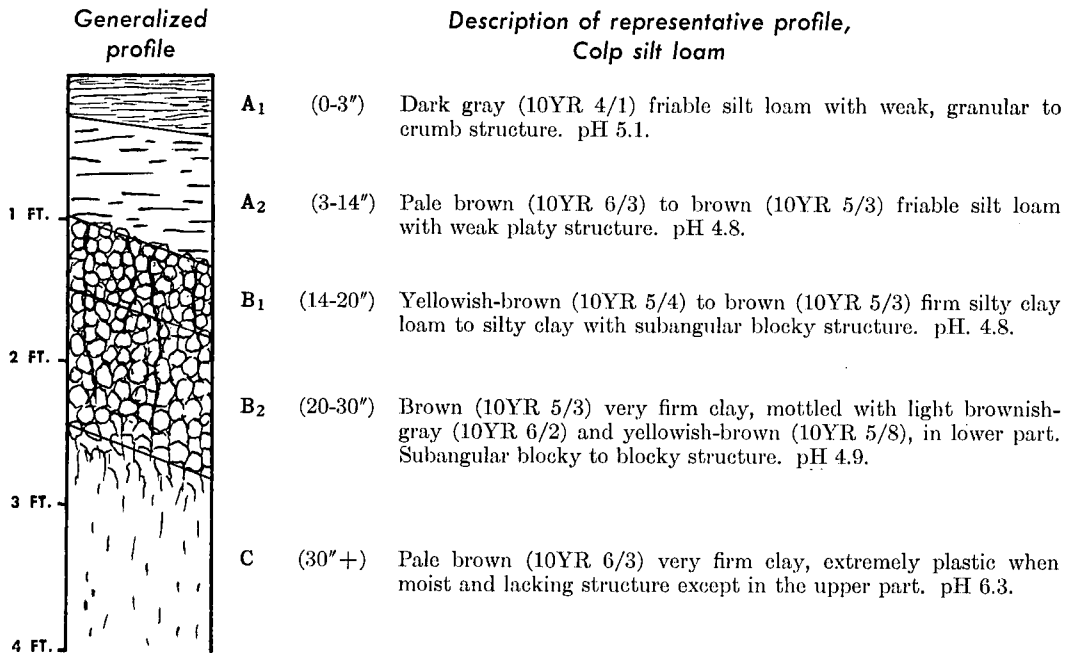
Raccoon silt loam is a light-colored, very poorly to poorly drained soil formed from colluvial sediments at the bases of slopes or near the heads of drainageways. It has developed on slopes of less than  $1\frac{1}{2}$  percent under forest vegetation. Where Raccoon occurs at the base of a slope, it usually grades gradually into bottomland soils such as Bonnie silt loam (108). The depth to the B horizon in Raccoon ordinarily varies between 24 and 35 inches.

Raccoon is used for grain and hay production as well as for pasture. However, for good crop growth, drainage by means of ditches must be provided, and large applications of soil amendments must be made. Raccoon, besides being strongly acid, is usually low in both available phosphorus and available potassium.



### Colp silt loam (122)

Colp silt loam is a light-colored, moderately well-drained soil developed under forest. It occurs in the terrace area along Big Muddy river where the sediments are Wisconsin-age, lake-laid clays covered with less than 24 inches of loess. Colp



occurs in association with Hurst (338) and Okaw (84) soils. Slopes of Colp range from about 2 percent to over 30 percent.

Profiles of Colp on the steeper slopes are somewhat thinner than the one described above. On steep slopes that have been cultivated, the A horizon is often absent because of erosion.

Colp soils on the lesser slopes are used largely for grain production. Moderate slopes are used for grain, hay, and pasture. Many of the steep slopes are in forest and should remain so. Colp is strongly acid, low in available phosphorus, and medium to high in available potassium. Because of the slow permeability of the lower subsoil, runoff on Colp is often rapid, causing serious erosion on slopes greater than about 3 percent.

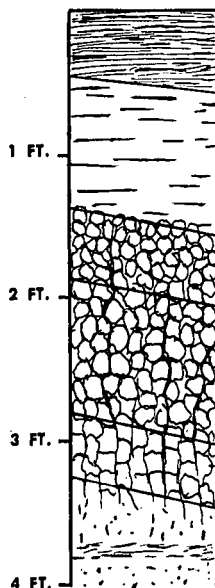
In Williamson county some naturally imperfectly drained soil areas were included with Colp.

### Starks silt loam (132)

Starks silt loam is a light-colored terrace soil developed under forest vegetation on slopes of less than 1½ percent. The parent materials are medium-textured sediments, with some sandy lenses usually present below about 40 inches. Starks occurs in association with Camden silt loam (134) in the Big Muddy river terrace area on the upper terrace level, usually near the break into the lower terrace level.

Because Starks occurs on nearly level areas, drainage is often required for the best crop growth. A few well-placed furrows are usually sufficient to remove excess water.

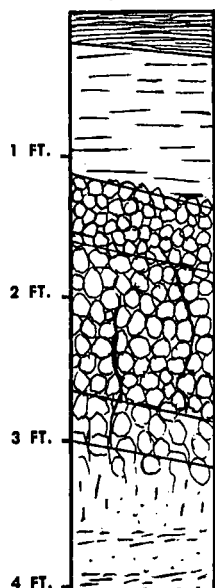
Starks is moderately acid, about medium in available phosphorus, and usually high in available potassium. Organic-matter content is low. Starks responds well to good soil management and is used mainly for corn, soybean, wheat, and hay production.

**Generalized  
profile****Description of representative profile,  
Starks silt loam**

<b>A<sub>p</sub></b>	(0-7")	Dark grayish-brown (10YR 4/2) friable silt loam with weak crumb structure. pH 5.8.
<b>A<sub>2</sub></b>	(7-18")	Pale brown (10YR 6/3) friable silt loam with platy structure. pH 5.5.
<b>B<sub>1</sub></b>	(18-24")	Brown (10YR 5/3) firm silty clay loam mottled with yellowish-brown (10YR 5/8) and gray (10YR 6/1). Subangular blocky structure. pH 5.0.
<b>B<sub>2</sub></b>	(24-35")	Yellowish-brown (10YR 5/4) firm silty clay loam mottled with light brownish-gray (10YR 6/2). Subangular blocky structure. pH 5.2.
<b>B<sub>3</sub></b>	(35-40")	Light yellowish-brown (10YR 6/4) firm silty clay loam mottled with gray (10YR 6/1). Weak blocky structure. pH 5.2.
<b>C</b>	(40"+)	Pale brown (10YR 6/3) loam to loose sandy loam. Structureless. pH 5.3.

**Camden silt loam (134)**

Camden silt loam is a light-colored, well-drained to moderately well-drained soil developed from medium-textured, Wisconsin-age sediments under forest vegetation. It occurs in the terrace area along Big Muddy river in association with Starks

**Generalized  
profile****Description of representative profile,  
Camden silt loam**

<b>A<sub>1</sub></b>	(0-3")	Dark grayish-brown (10YR 4/2) friable silt loam with weak crumb structure. pH 5.8.
<b>A<sub>2</sub></b>	(3-14")	Brown (10YR 5/3) friable silt loam with platy structure. pH 5.4.
<b>B<sub>1</sub></b>	(14-20")	Yellowish-brown (10YR 5/4) firm silty clay loam with subangular blocky structure. pH 5.5.
<b>B<sub>2</sub></b>	(20-34")	Yellowish-brown (10YR 5/6) to dark yellowish-brown (10YR 4/4) firm silty clay loam with subangular blocky structure. pH 5.6.
<b>B<sub>3</sub></b>	(34-40")	Yellowish-brown (10YR 5/6) firm clay loam with weak subangular blocky structure. pH 5.6.
<b>C</b>	(40"+)	Brown (10YR 5/3) loose sandy loam to loam. Structureless. pH 5.5.

Table 12. — CHEMICAL ANALYSES AND PARTICLE SIZE DISTRIBUTION  
OF CAMDEN SILT LOAM<sup>a</sup>

Horizon <sup>b</sup>	Depth	pH	Or- ganic car- bon <sup>c</sup>	Exchangeable cations <sup>d</sup>			Cation ex- change capac- ity	Base satura- tion	Particle size distribution		
				Ca	Mg	K			Sand 2-.05 mm.	Silt .05-.002 mm.	Clay <.002 mm.
	in.		pct.	me./ 100 gm.	me./ 100 gm.	me./ 100 gm.	me./ 100 gm.	pct.	pct.	pct.	pct.
A <sub>2</sub> .....	5½-12	6.8	.60	4.9	1.8	.2	10.2	70	15.5	60.5	12.0
B <sub>2-1</sub> .....	18-23	4.9	.12	5.0	2.1	.3	16.6	45	15.3	29.9	27.4
B <sub>2-2</sub> .....	23-30	4.8	.13	4.7	2.7	.3	17.8	43	21.0	23.0	28.0
B <sub>2-3</sub> .....	30-40	4.8	.14	5.7	3.6	.3	20.4	47	10.1	31.1	29.4
B <sub>3</sub> .....	40-48	4.8	.10	5.8	3.7	.3	21.3	46	4.3	37.3	29.2
C <sub>1</sub> .....	48-60	4.6	.07	5.0	3.4	.3	18.2	48	19.5	29.9	25.3

<sup>a</sup> Profile sampled in Lawrence county. Township 4 north, Range 12 west, Section 21, southeast ¼, northeast 40 acres, northwest 10 acres.

<sup>b</sup> Analyses were not run on the following horizons: A<sub>p</sub>, 0-5½ inches; A<sub>s</sub>, 12-15 inches; B<sub>1</sub>, 15-18 inches.

<sup>c</sup> Percent organic carbon times 1.724 = percent organic matter.

<sup>d</sup> One me. of Ca (calcium) per 100 gm. soil = 400 pounds per acre or per 2 million pounds soil. One me. of Mg (magnesium) per 100 gm. soil = 240 pounds per acre or per 2 million pounds soil. One me. of K (potassium) per 100 gm. soil = 780 pounds per acre or per 2 million pounds soil.

silt loam (132) and is usually found on the break from the higher terrace level to the lower terrace level. Camden in Williamson county occurs on slopes ranging from 1 to about 18 percent gradient.

Camden is moderately to strongly acid, usually low in available phosphorus, and about medium in available potassium. It responds well to good management, and where not too sloping, is used for corn, soybean, and wheat production. The steeper slopes should be used for hay and pasture.

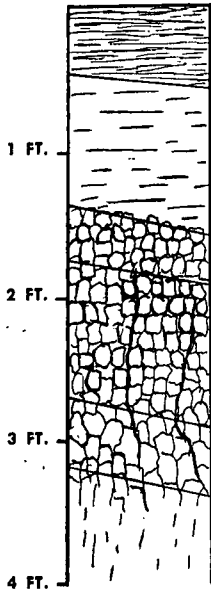
Some physical and chemical properties of Camden are given in Figure 21, page 62, as well as in Table 12.

### Stoy silt loam (164)

Stoy silt loam is a light-colored upland soil found in association with Weir (165) and Hosmer (214) in western and southwestern Williamson county. These soils have developed from thicker loess (65 to about 150 inches) than Wynoose (12), Bluford (13), and Ava (14) in the northeastern part of the county, and are not as highly weathered.

The loess from which Stoy has developed may be underlain by weathered Illinoian till, bedrock residuum, or sandstone bedrock. Stoy has developed under forest on slopes ranging between 1 and 7 percent and is imperfectly drained.

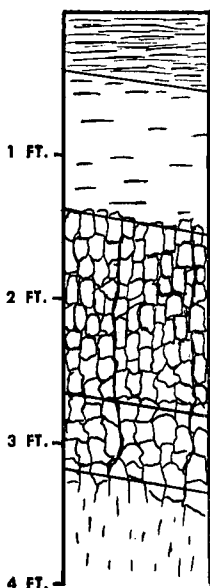
Stoy is strongly acid, low in available phosphorus, and low to medium in available potassium. Organic matter and nitrogen are also low. However, this soil responds well to soil treatment and is used for corn, soybean, wheat, and hay production.

**Generalized  
profile****Description of representative profile,  
Stoy silt loam**

- |                      |          |  |
|----------------------|----------|--|
| <b>A<sub>p</sub></b> | (0-6")   | Dark grayish-brown (10YR 4/2) to grayish-brown (10YR 5/2) friable silt loam with weak crumb structure. pH 5.0.   |
| <b>A<sub>2</sub></b> | (6-18")  | Pale brown (10YR 6/3) to light yellowish-brown (10YR 6/4) friable silt loam with platy structure. pH 4.9.  |
| <b>B<sub>1</sub></b> | (18-22") | Brown to pale brown (10YR 5/3 to 6/3) firm silty clay loam with blocky to subangular blocky structure. Some light gray (10YR 7/1) mottles are present. pH 4.6. |
| <b>B<sub>2</sub></b> | (22-32") | Brown (10YR 5/3) firm silty clay loam mottled with light brownish-gray (10YR 6/2). Blocky structure. pH 4.7.   |
| <b>B<sub>3</sub></b> | (32-40") | Pale brown (10YR 6/3), mottled with light brownish-gray (10YR 6/2), firm silty clay loam. Coarse blocky structure. pH 4.8.                                     |
| <b>C</b>             | (40"+)   | Pale brown (10YR 6/3), mottled with gray (10YR 6/1), friable silt loam. Nearly structureless. pH 4.9.  |

**Weir silt loam (165)**

Weir silt loam is a light-colored, poorly to very poorly drained, upland soil developed under forest. The parent material is 65 to about 150 inches of loess on weathered Illinoian till, bedrock residuum, or sandstone bedrock. Weir occurs on slopes of less than 1½ percent in association with Stoy (164) and Hosmer (214). In morphology, Weir is quite similar to Wynoose silt loam (12), but since it has

**Generalized  
profile****Description of representative profile,  
Weir silt loam**

- |                      |          |   |
|----------------------|----------|---|
| <b>A<sub>p</sub></b> | (0-6")   | Grayish-brown (10YR 5/2) friable silt loam with weak crumb structure. pH 4.9.   |
| <b>A<sub>2</sub></b> | (6-19")  | Light gray (10YR 7/1 to 7/2) friable silt loam with platy structure. pH 4.8.  |
| <b>B<sub>2</sub></b> | (19-34") | Mixed light gray (10YR 7/1) and pale brown (10YR 6/3), with spots of yellowish-brown (10YR 5/8), firm to very firm silty clay loam with blocky structural aggregates, arranged in prismatic form. pH 4.7. |
| <b>B<sub>3</sub></b> | (34-42") | Light brownish-gray (10YR 6/2) mottled with yellowish-brown (10YR 5/8) firm silty clay loam with coarse blocky structure. pH 4.6.   |
| <b>C</b>             | (42"+)   | Light brownish-gray (10YR 6/2), mottled faintly with yellowish-brown (10YR 5/8), friable silt loam with little structure. pH 5.0.   |



Table 13. — CHEMICAL ANALYSES AND PARTICLE SIZE DISTRIBUTION OF WEIR SILT LOAM<sup>a</sup>

Horizon	Depth	pH	Or- ganic car- bon <sup>b</sup>	Exchangeable cations <sup>c</sup>			Cation ex- change capac- ity	Base satura- tion	Particle size distribution		
				Ca	Mg	K			Sand 2-.05 mm.	Silt .05-.002 mm.	Clay <.002 mm.
	<i>in.</i>		<i>pct.</i>	<i>me./ 100 gm.</i>	<i>me./ 100 gm.</i>	<i>me./ 100 gm.</i>	<i>me./ 100 gm.</i>	<i>pct.</i>	<i>pct.</i>	<i>pct.</i>	<i>pct.</i>
A <sub>1</sub> .....	0-8	6.2	.70	6.8	2.1	.3	13.6	69	7.5	79.3	13.2
A <sub>2</sub> .....	8-17	4.6	.07	2.6	1.0	.3	11.1	37	7.6	77.8	14.6
B <sub>1</sub> .....	17-21	4.4	.05	4.3	4.0	.5	23.2	39	4.7	65.1	30.2
B <sub>2</sub> .....	21-39	4.6	.08	10.7	3.7	.5	32.4	48	3.1	58.7	38.2
B <sub>3</sub> .....	39-46	4.8	.02	7.0	6.7	.4	24.3	60	2.7	70.7	26.6

<sup>a</sup> Profile sampled in Lawrence county. Township 3 north, Range 12 west, Section 2, northwest ¼, northwest 40 acres, northwest 10 acres.

<sup>b</sup> Percent organic carbon times 1.724 = percent organic matter.

<sup>c</sup> One me. of Ca (calcium) per 100 gm. soil = 400 pounds per acre or per 2 million pounds soil. One me. of Mg (magnesium) per 100 gm. soil = 240 pounds per acre or per 2 million pounds soil. One me. of K (potassium) per 100 gm. soil = 780 pounds per acre or per 2 million pounds soil.

developed from thicker loess, it is less weathered and less developed than Wynoose (Tables 8 and 13).

Weir is strongly acid, low in available phosphorus, and low to medium in available potassium. While this soil responds fairly well to soil amendments and good cultural practices, drainage is one of the first requirements for improving its productivity. Drainage can usually be provided best by means of surface ditches, since tile do not function satisfactorily in the slowly permeable, claypan B horizon. A few areas are so low-lying that rather deep cuts must be made through surrounding soils to secure adequate outlets.

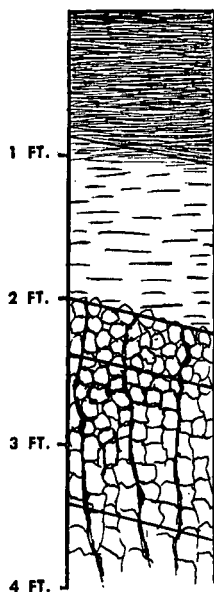
In the fall of 1955, deep tillage and deep fertilization experiments were started on Weir silt loam at the Cooperative Agronomy Research Center, Carbondale (4). To date neither deep tillage nor deep fertilization has increased yields over those obtained with conventional tillage or soil treatment.

Weir is used for grain, hay, and pasture production.

Lukin silt loam (167)

Lukin silt loam is a dark to very dark grayish-brown soil developed under grass from loess and colluvial sediments near drainageways or at the base of slopes from surrounding higher land. It occurs on topography with 1- to 4-percent gradients. An imperfectly drained soil, Lukin is associated with the poorly to very poorly drained Chauncey silt loam (287) and also with Hoyleton (3) and Richview (4) soils. In many respects, it is somewhat similar to Hoyleton silt loam but differs chiefly in that the depth to the B horizon is greater than 24 inches, whereas the depth to the B in Hoyleton is less than 24 inches.

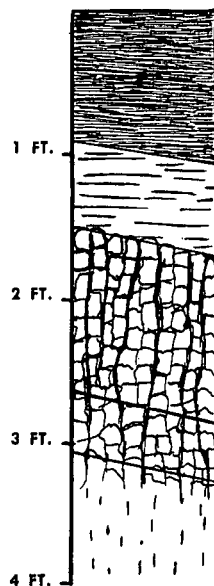
Lukin silt loam is a productive soil and is used largely for grain production. Since it is strongly acid, low in available phosphorus, and about medium in available potassium, rather large amounts of limestone and fertilizer must be applied to produce high crop yields. Ordinarily drainage is not a serious problem on Lukin. Erosion may become serious on the more sloping areas if steps are not taken to control it.

**Generalized  
profile****Description of representative profile,  
Lukin silt loam**

- A<sub>1</sub>** (0-12") Dark to very dark grayish-brown (10YR 4/2 to 3/2) friable silt loam with weak crumb structure. pH 5.5.
- A<sub>2</sub>** (12-26") Brown to pale brown (10YR 5/3 to 6/3) friable silt loam with weak crumb or coarse granular to weak platy structure. pH 5.1.
- B<sub>1</sub>** (26-30") Pale to very pale brown (10YR 6/3 to 7/3) firm silty clay loam mottled with light gray (10YR 7/1) and yellowish-brown (10YR 5/8). Blocky to subangular blocky structure. pH 4.8.
- B<sub>2</sub>** (30-38") Gray (10YR 6/1) to light brownish-gray (10YR 6/2), mottled with yellowish-brown (10YR 5/8), firm silty clay loam with blocky structure. pH 4.6.
- B<sub>3</sub>** (38-48") Light brownish-gray (10YR 6/2), mottled with yellowish-brown (10YR 5/8), firm, coarse silty clay loam with weak blocky structure. pH 5.0.

**Marissa silt loam (176)**

Marissa silt loam is a moderately dark-colored, poorly to imperfectly drained soil formed from less than 24 inches of silty material on water-deposited silty clay or clay of Wisconsin age. Marissa developed under mixed grass and forest vegetation.

**Generalized  
profile****Description of representative profile,  
Marissa silt loam**

- A<sub>1</sub>** (0-9") Very dark gray (10YR 3/1) to dark gray (10YR 4/1) friable silt loam with crumb to granular structure. pH 6.0.
- A<sub>2</sub>** (9-18") Grayish-brown (10YR 5/2) to light brownish-gray (10YR 6/2) friable silt loam with granular to weak platy structure. pH 5.0.
- B<sub>2</sub>** (18-32") Gray (10YR 5/1) mottled with yellowish-brown (10YR 5/8) firm, fine silty clay loam with blocky structure. pH 5.2.
- B<sub>3</sub>** (32-40") Gray (10YR 5/1), mottled with yellowish-brown (10YR 5/8), very firm silty clay with weak blocky structure. pH 5.4.
- C** (40"+) Gray (10YR 6/1) to light brownish-gray (2.5Y 6/2) very firm silty clay or clay with little structure. pH 6.3.

Although it was forested at the time of settlement, the trees had not entirely changed some of the characteristics imparted by the earlier grass.

Marissa occurs on the Big Muddy river terrace area in the northwestern part of the county in association with Okaw (84), Hurst (338), and Colp (122) soils. Slopes of Marissa in this area range between  $\frac{1}{2}$  and 4 percent.

Marissa is one of the most productive soils in Williamson county. It is darker colored and has a greater nitrogen supplying power than most of the other soils. It is moderately acid, low in available phosphorus, and medium to high in available potassium.

On the more level areas, drainage is a problem. Surface ditches are usually the most satisfactory means of removing excess water although tile usually function satisfactorily if outlets are available.

### Hosmer silt loam (214)

Hosmer silt loam is a light-colored, moderately well-drained, upland soil developed under forest on 2- to 18-percent slopes. The parent material is usually about 65 inches or more of loess, but on the steeper areas, where Hosmer grades into Manitou soils, the loess may be as thin as 40 inches. Hosmer occurs in western and south-western Williamson county, where the loess may be underlain by weathered Illinoian till, bedrock residuum, or sandstone bedrock. It is associated with the Weir (165), Stoy (164), and Manitou (340) soils.

In some areas in Williamson county, Hosmer is so intermingled with Hickory loam (8) that the two could not be shown separately on the small-scale soil map. These complex areas are marked 8-214 on the map.

The upper part of the Hosmer profile has good physical properties; it has good moisture-storage capacity and is permeable to water and plant roots. However,

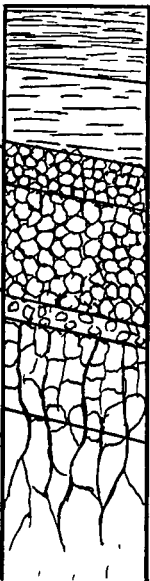
Generalized profile	Description of representative profile, Hosmer silt loam	
	A <sub>p</sub>	(0-6") Dark grayish-brown (10YR 4/2) friable silt loam with weak crumb structure. pH 5.0.
	A <sub>2</sub>	(6-14") Brownish-yellow to yellowish-brown (10YR 6/6-5/4) friable silt loam with platy structure. pH 4.7.
	B <sub>1</sub>	(14-18") Yellowish-brown (10YR 5/4) firm silty clay loam with granular to fine subangular blocky structure. pH 4.7.
	B <sub>2</sub>	(18-26") Yellowish-brown (10YR 5/4) to brown (7.5YR 5/4) firm silty clay loam with subangular blocky structure. pH 4.8.
	Gray layer	(26-30") Yellowish-brown (10YR 5/4) firm silty clay loam with subangular blocky structural aggregates that are coated with light gray (10YR 7/2). pH 4.8.
	Lower B	(30-38") Yellowish-brown (10YR 5/4), mottled with gray (10YR 6/1), firm silty clay loam with prismatic to blocky structure. pH 4.8.
	Fragipan B	(38-48" +) Yellowish-brown (10YR 5/4), mottled with light gray (10YR 7/2), firm silt loam with large polygonal or many-sided aggregates bounded by white (10YR 8/1) streaks of clay and silt. Hard and also brittle when dry. pH 4.9.

Table 14. — CHEMICAL ANALYSES AND PARTICLE SIZE DISTRIBUTION OF HOSMER SILT LOAM<sup>a</sup>

Horizon	Depth	pH	Or- ganic car- bon <sup>b</sup>	Exchangeable cations <sup>a</sup>			Cation ex- change capac- ity	Base satura- tion	Particle size distribution		
				Ca	Mg	K			Sand 2-.05 mm.	Silt .05-.002 mm.	Clay <.002 mm.
	<i>in.</i>		<i>pct.</i>	<i>me./ 100 gm.</i>	<i>me./ 100 gm.</i>	<i>me./ 100 gm.</i>	<i>me./ 100 gm.</i>	<i>pct.</i>	<i>pct.</i>	<i>pct.</i>	<i>pct.</i>
A <sub>p</sub> .....	0-8	6.5	.71	6.8	1.6	.1	13.2	66	4.5	80.7	14.8
A <sub>2</sub> .....	8-15	5.0	.31	...	...	...	...	...	2.0	79.9	18.1
B <sub>2</sub> .....	15-25	4.7	.05	2.6	1.7	.2	14.9	32	1.8	75.8	22.4
Gray layer	25-28	4.6	.04	...	...	...	...	...	1.4	68.2	30.4
Lower B...	28-36	4.6	.04	3.7	4.5	.3	24.0	38	1.3	67.0	31.4
Fragipan											
B.....	36-48	4.6	.01	...	...	...	....	..	1.0	72.5	26.5
Fragipan											
C.....	48-56	4.7	.01	5.8	5.3	.3	20.3	59	1.0	76.0	23.0

<sup>a</sup> Profile sampled in Williamson county. Township 9 south, Range 2 east, Section 19, northwest  $\frac{1}{4}$ , northeast 40 acres, northwest 10 acres.  
<sup>b</sup> Percent organic carbon times 1.724 = percent organic matter.  
<sup>c</sup> One me. Ca (calcium) per 100 gm. soil = 400 pounds per acre or per 2 million pounds soil. One me. Mg (magnesium) per 100 gm. soil = 240 pounds per acre or per 2 million pounds soil. One me. K (potassium) per 100 gm. soil = 780 pounds per acre or per 2 million pounds soil.

the slightly to moderately well-developed fragipan in the lower part of the profile restricts root penetration to the gray streaks. Since few roots penetrate the fragipan, little moisture is obtained in this zone.

Hosmer is strongly acid, low in available phosphorus, and about medium in available potassium. It responds well to soil treatment and where not too steep is used for grain crops. Slopes over about 7 percent are best used for hay and pasture since erosion is severe if these slopes are cultivated (Fig. 13).

Some chemical and physical properties of Hosmer silt loam are given in Figure 21, page 62, as well as in Table 14.



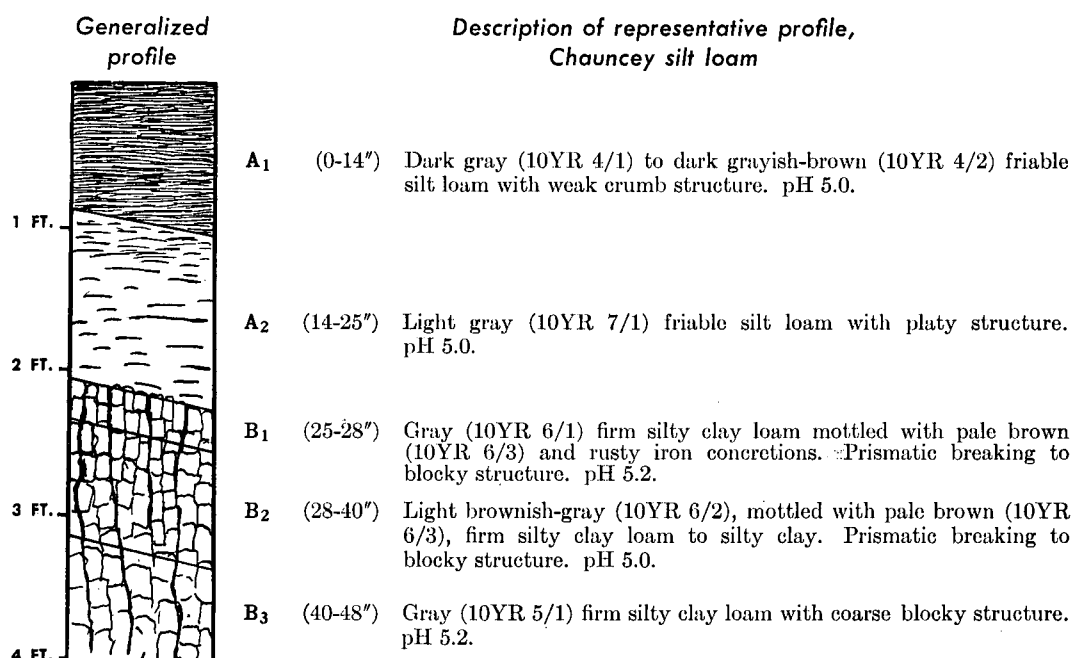
Hosmer silt loam occurs on the ridge tops and more gentle slopes in this pasture. Manitou silt loam is present on the steeper slopes. (Fig. 13)

### Chauncey silt loam (287)

Chauncey silt loam is a dark to very dark grayish-brown upland soil developed under grass from loess and colluvial sediments near drainageways or at the base of slopes from surrounding higher land. It occurs on land that has less than  $1\frac{1}{2}$  percent gradient. Chauncey is poorly to very poorly drained and is associated with the imperfectly drained Lukin silt loam (167), and also with Cisne (2) and Hoyleton (3) soils. Chauncey differs from Cisne chiefly in that the depth to the B horizon is greater than 24 inches, whereas the depth to the B horizon in Cisne is less than 24 inches.

Chauncey is moderately to strongly acid, low in available phosphorus, and low to medium in available potassium. It responds well to soil treatment provided adequate drainage has been established. The heavy texture and very slow permeability of the subsoil makes the use of tile impractical. Most areas have enough slope that a system of ditches can be used effectively to remove excess water.

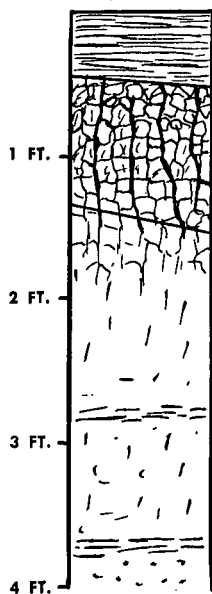
Chauncey is used mainly for corn, soybean, wheat, and hay production.



### Petrolia silty clay loam (288)

Petrolia silty clay loam is a light-colored bottomland soil found in a few small, low-lying areas along South Fork Saline river. It is associated with Bonnie (108), Belknap (382), and Sharon (72) soils in Williamson county.

This soil is poorly to very poorly drained, and providing proper drainage is a serious problem on most areas. Surface ditches are usually best for removing excess water, although tile will function slowly if suitable outlets are available. Maintenance of good physical condition is sometimes difficult because the surface soil is low in organic matter, and also because the soil is often cultivated when it is too wet.

Generalized  
profileDescription of representative profile,  
*Petrolia silty clay loam*

- A<sub>p</sub>** (0-6") Grayish-brown (10YR 5/2) firm silty clay loam with granular to fine blocky structure. pH 6.0.
- BC** (6-18") Light brownish-gray (10YR 6/2) firm silty clay loam mottled with very dark brown (10YR 2/2) soft iron concretions. Blocky to granular structure. pH 6.4.
- C** (18"+) Light brownish-gray (10YR 6/2) and light gray (10YR 7/1), mottled with yellowish-brown (10YR 5/8), firm silty clay loam. Weak, fine blocky structure in upper part, structureless below. pH 6.4.

Petrolia is slightly acid, low in available phosphorus, and low to medium in available potassium. It responds well to soil treatment if adequately drained. Most areas of this limited soil type in Williamson county are in timber.

**Grantsburg silt loam (301)**

Profile of Grantsburg silt loam. Note the gray mottled fragipan zone in the lower part. (Fig. 14)

Grantsburg is a light-colored soil that has developed under forest on slopes ranging from 2 to 12 percent. It occurs in eastern and southeastern Williamson county in association with Robbs silt loam (335) and Manitou silt loam (340). Parent material of Grantsburg and Robbs is loess over sandstone residuum or sandstone bedrock, the loess seldom exceeding 80 inches in thickness. These soils have thus developed from thinner loess than Hosmer (214), Stoy (164), and Weir (165) in the southwestern part of the county, and are therefore more highly weathered.

The fragipan in Grantsburg is more strongly developed and somewhat nearer the surface of the soil profile than the fragipan of Hosmer. As a result, the Grantsburg fragipan is probably more restrictive to plant roots. Like Hosmer,

Grantsburg responds well to soil treatment (see Table 22, page 66), although it is in general a more weathered and leached soil.

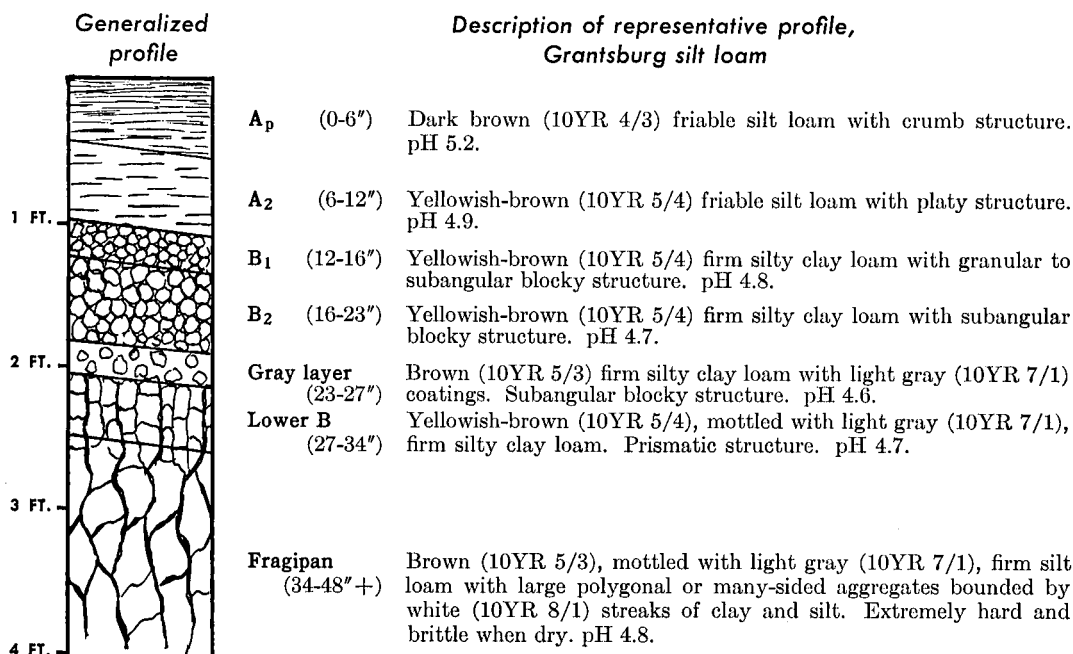


Table 15. — CHEMICAL ANALYSES AND PARTICLE SIZE DISTRIBUTION OF GRANTSBURG SILT LOAM<sup>a</sup>

Horizon	Depth <sup>b</sup>	pH	Or- ganic car- bon <sup>c</sup>	Exchangeable cations <sup>d</sup>			Cation ex- change capac- ity	Base satura- tion	Particle size distribution		
				Ca	Mg	K			Sand 2-.05 mm.	Silt .05-.002 mm.	Clay <.002 mm.
	in.		pct.	me./ 100 gm.	me./ 100 gm.	me./ 100 gm.	me./ 100 gm.	pct.	pct.	pct.	pct.
A <sub>2</sub> .....	1-6½	4.2	.72	.5	.3	.3	10.2	14	2.4	84.6	13.0
B.....	12-17	4.7	.24	1.2	3.0	.3	16.7	28	2.5	71.1	26.4
B.....	20-24	4.6	.14	1.0	3.2	.3	16.4	28	3.7	75.1	21.2
Gray layer	24-27	4.6	.17	2.6	6.6	.4	23.7	41	1.7	66.2	31.3
Lower B..	27-33	4.5	.10	3.5	7.8	.3	23.1	47	2.1	65.8	32.1
Fragiapan..	38-45	4.6	.05	4.1	7.4	.3	21.5	57	1.7	68.3	25.0
Fragiapan..	52-61	5.2	.03	4.2	5.5	.2	15.2	70	3.4	78.6	18.0

<sup>a</sup> Profile sampled in Pope county. Township 13 south, Range 5 east, Section 4, northwest ¼, northeast 40 acres, northeast 10 acres.

<sup>b</sup> Analyses were not run on all depths sampled.

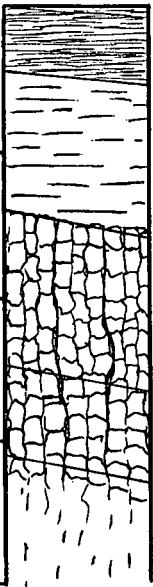
<sup>c</sup> Percent organic carbon times 1.724 = percent organic matter.

<sup>d</sup> One me. Ca (calcium) per 100 gm. soil = 400 pounds per acre or per 2 million pounds soil. One me. Mg (magnesium) per 100 gm. soil = 240 pounds per acre or per 2 million pounds soil. One me. K (potassium) per 100 gm. soil = 780 pounds per acre or per 2 million pounds soil.

### Robbs silt loam (335)

Robbs silt loam is an imperfectly drained upland soil developed under forest from less than 80 inches of loess over bedrock or residuum. It occurs in eastern and southeastern Williamson county in association with Grantsburg silt loam (301). Robbs is similar in many ways to Stoy silt loam (164), but has developed from thinner loess and is a more weathered soil. It occurs on slopes between 1 and 4 percent.

Since Robbs occurs on gentle slopes, neither drainage nor erosion is ordinarily a serious problem. This soil is strongly acid, low in available phosphorus, and low to medium in available potassium. Response to soil treatment is generally good (see Table 22, page 66). Robbs is used for corn, soybean, wheat, hay, and pasture production.

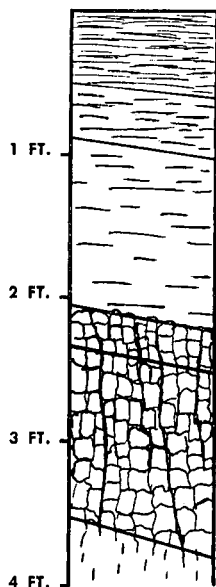
Generalized profile	Description of representative profile, Robbs silt loam	
	<b>A<sub>p</sub></b>	(0-6") Dark grayish-brown (10YR 4/2) to brown (10YR 4/3) friable silt loam with weak crumb structure. pH 5.2.
	<b>A<sub>2</sub></b>	(6-19") Light yellowish-brown (10YR 6/4) friable silt loam with platy structure. pH 5.1.
	<b>B<sub>2</sub></b>	(19-32") Light brownish-gray (10YR 6/2) very firm silty clay loam mottled with light gray (10YR 7/1) and dark yellowish-brown (10YR 4/4). Prismatic breaking to blocky structure. pH 4.8.
	<b>B<sub>3</sub></b>	(32-42") Pale brown (10YR 6/3) very firm silty clay loam mottled with light gray (10YR 7/1) and yellowish-brown (10YR 5/8). Coarse blocky structure. pH 4.9.
	<b>C</b>	(42" +) Pale brown (10YR 6/3) to brown (10YR 5/3), mottled with gray (10YR 6/1), friable to firm silt loam. Structureless. pH 5.1.

### Creal silt loam (337)

Creal silt loam is an imperfectly drained light-colored soil associated with the poorly to very poorly drained Racoon silt loam (109). Creal developed under forest from loess and colluvial sediments near drainageways or at the base of slopes from surrounding higher land. The areas where Creal occurs have grades of 1 to 4 percent. Creal resembles Bluford silt loam (13) in many of its characteristics, but has a greater depth to the B horizon (over 24 inches).

Drainage and erosion are not ordinarily serious problems. Creal is strongly acid, low in available phosphorus, about medium in available potassium, and low in organic matter. It responds well to soil amendments and is used largely for grain and hay production.

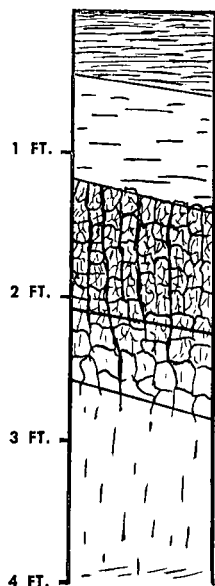


**Generalized  
profile****Description of representative profile,  
Creal silt loam**

- |                        |          |   |
|------------------------|----------|---|
| <b>A<sub>p</sub></b>   | (0-6")   | Dark brown (10YR 4/3) to brown (10YR 5/3) friable silt loam with weak crumb structure. pH 5.1.  |
| <b>A<sub>2-1</sub></b> | (6-12")  | Pale brown (10YR 6/3) friable silt loam with weak crumb structure. pH 5.0.  |
| <b>A<sub>2-2</sub></b> | (12-26") | Light yellowish-brown (10YR 6/4), with some very pale brown (10YR 7/4), friable silt loam with platy structure. pH 4.9.   |
| <b>B<sub>1</sub></b>   | (26-30") | Pale brown (10YR 6/3), mottled with yellowish-brown (10YR 5/8) and light gray (10YR 7/2), firm silty clay loam with blocky structure. pH 4.9.                                 |
| <b>B<sub>2</sub></b>   | (30-44") | Light brownish-gray (10YR 6/2), mottled with yellowish-brown (10YR 5/8) and light gray (10YR 7/1), firm silty clay loam. Weak prismatic breaking to blocky structure. pH 5.0. |
| <b>C</b>               | (44"+)   | Light brownish-gray (10YR 6/2), nearly structureless, firm to friable silty clay loam to silt loam. pH 5.3.   |

**Hurst silt loam (338)**

Hurst silt loam is a light-colored soil developed under forest from less than 24 inches of silty material over Wisconsin-age lake-laid clays. It occurs on slopes of less than 1½ percent on the terrace area along Big Muddy river and is associated with

**Generalized  
profile****Description of representative profile,  
Hurst silt loam**

- |                      |          |  |
|----------------------|----------|--|
| <b>A<sub>p</sub></b> | (0-6")   | Dark grayish-brown (10YR 4/2) to grayish-brown (10YR 5/2) friable silt loam with weak crumb structure. pH 4.8.             |
| <b>A<sub>2</sub></b> | (6-15")  | Light brownish-gray (10YR 6/2) to light gray (10YR 7/1) in lower part; friable silt loam with platy structure. pH 4.8.     |
| <b>B<sub>2</sub></b> | (15-32") | Light brownish-gray (2.5Y 6/2) very firm silty clay to clay with fine blocky structure arranged in prismatic form. pH 4.9. |
| <b>B<sub>3</sub></b> | (32-36") | Grayish-brown (2.5Y 5/2) to olive gray (5Y 5/2) very firm clay with coarse blocky structure. pH 5.5.                       |
| <b>C</b>             | (36"+)   | Olive gray (5Y 5/2) very firm clay with little structure. pH 5.6.  |

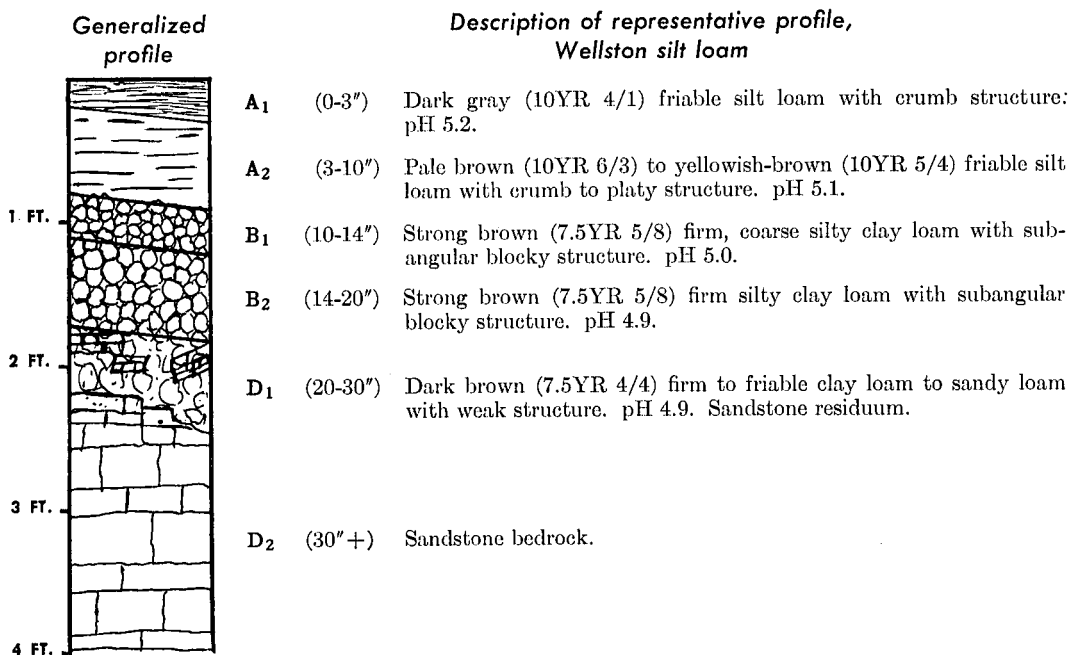
Okaw (84) and Colp (122) soils. Hurst differs from Okaw chiefly in having developed from thicker silty material and in being somewhat better drained.

Hurst is naturally poorly to imperfectly drained. Open ditches are recommended on this soil type since the very slowly permeable subsoil will not permit satisfactory tile drainage.

Hurst is strongly acid, low in available phosphorus, and medium to high in available potassium. It is used for grain and hay production.

### Wellston silt loam (339)

Wellston silt loam is a well-drained upland soil developed under forest from about 10 to 20 inches of loess over sandstone residuum or sandstone bedrock. It occurs on slopes varying from 10 to over 30 percent, in association with Manitou silt loam (340) and steep rocky land (9).



Wellston is found in unglaciated sections in the southern part of Williamson county, and also in small elevated areas in the eastern part that were not over-ridden by the glacier.

Wellston is not adapted for cultivated crops in Williamson county. Some areas that are not too steep may be used for pasture, but the strongly sloping areas should be used mainly for timber.

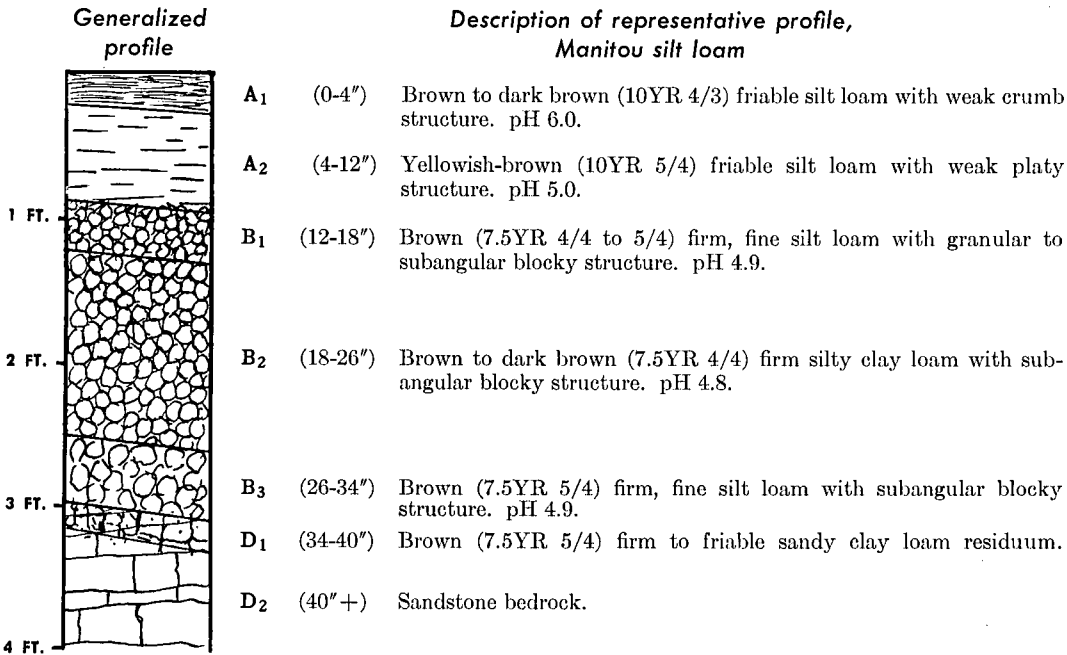
Wellston is strongly acid, low in available phosphorus, and usually high in available potassium. Because of shallow depth to bedrock, this soil is somewhat drouthy. Erosion losses, which reduce the thickness of the soil over bedrock, further decrease the moisture-supplying capacity of this soil.

**Manitou silt loam (340)**

Manitou silt loam is a well-drained to moderately well-drained, light-colored soil developed under forest from about 20 to 40 inches of loess over sandstone residuum or sandstone bedrock. It occurs on 10- to 30-percent slopes in the unglaciated southern and eastern sections of Williamson county, in association with Grantsburg (301), Hosmer (214), and Wellston (339) soils, and steep rocky land (9).

Few areas of Manitou in Williamson county are adapted to cultivated crops. It is used primarily for pasture or hay production, with some areas devoted to forest.

Manitou is strongly acid, low in available phosphorus, and medium to high in available potassium. Pastures on this soil respond well to soil treatment and to good management in general. Erosion is a serious problem, but can be controlled reasonably well if vigorous pastures are grown and overgrazing is prevented.



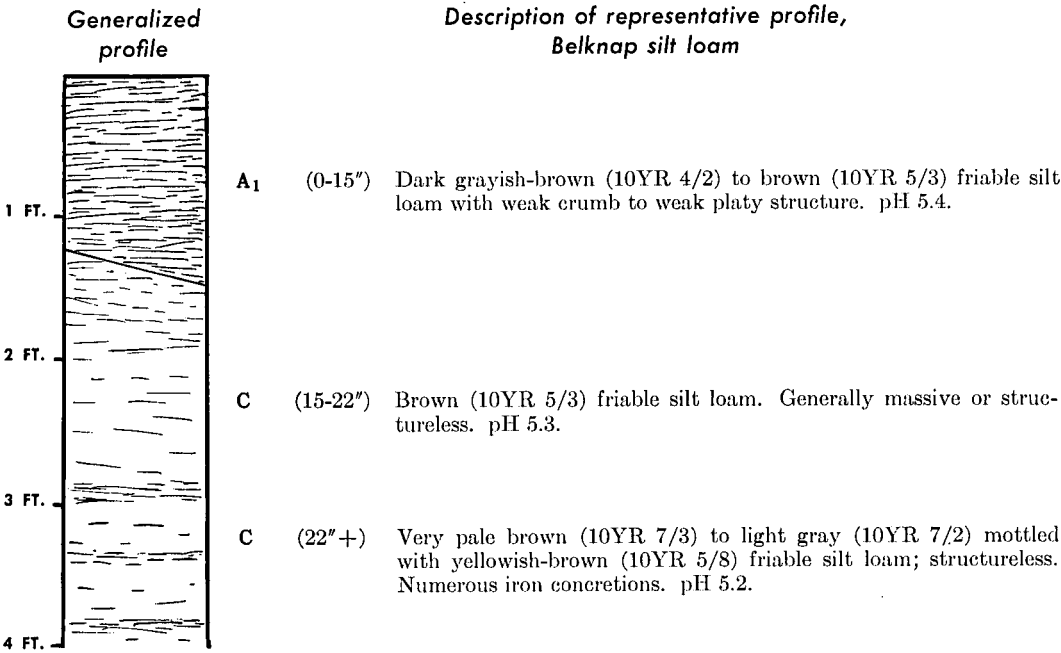
**Belknap silt loam (382)**

Belknap silt loam is an imperfectly drained light-colored soil derived from acid, medium-textured sediments on the flood plains of small streams in Williamson county. It occurs on slopes of less than 1½ percent in association with Bonnie silt loam (108) and Sharon silt loam (72), and in many respects is intermediate between these two soils.

Providing drainage, improving fertility, and maintaining good tilth are the major problems on Belknap. Although tile will function satisfactorily in many areas under good management, open ditches are usually the best means of securing adequate drainage. Belknap is moderately to strongly acid, and low in available phosphorus, available potassium, and organic matter; but it responds well to soil

amendments if adequately drained. Sod crops in the rotation will help provide fresh supplies of organic matter and will help maintain good physical condition in the surface soil.

Belknap is used for corn, soybean, and pasture production (Figure 15). Overflow and wetness in late winter and early spring makes the growth of small grains hazardous on this soil.



A cultivated area of Belknap silt loam in a small bottomland. (Fig. 15)

## GENESIS AND CLASSIFICATION OF WILLIAMSON COUNTY SOILS

### Factors of Soil Formation in Various Soil Associations

Soils are developed primarily by the action of climate and living plants and animals upon parent materials. Relief or topography indirectly affects soil formation by influencing drainage conditions. The time during which parent materials have been subjected to these forces partly determines the degree to which the present soils have weathered and developed.

How these five major factors of soil development—parent material, climate, biological activity or living organisms, relief, and time—have influenced the soils of Williamson county and their distribution is discussed in the following paragraphs. (See also soil association map, page 54, and soil key, page 56.)

**Parent materials** result mainly from the weathering of rock. Glaciers, wind, and water may move these materials from place to place. Most Williamson county soils developed from glacial till, deposited by the ice of glaciers; loess, deposited by the wind; or alluvium and lake-bed sediments, deposited by water. Of lesser importance is residuum or parent material formed in place by the weathering of sandstone on the steep, unglaciated slopes in the southern part of the county.

Glacial till, originally about a loam in texture, is the parent material of Hickory loam in soil associations H and O on the steeper slopes of the glaciated section of the county. No doubt some of these slopes were once covered by loess, but it was removed by erosion. The sand and pebbles in the Hickory soils are very little changed from what they were in the original glacial till. Some of the clay deposited in the surface of the till, as well as that formed in place, has been washed down into the

B horizon or subsoil, making it a clay loam in texture.

Both glacial till and loess, when first deposited in Williamson county, were calcareous or relatively high in limestone and also contained various minerals. Soils developed from them were probably high in plant nutrients at first. But, as will be discussed later, the action of climate and living organisms over long periods of time has leached plant nutrients in varying degrees from these parent materials. The result has been soils which, in general, require large applications of lime and fertilizer for good crop growth.

As was mentioned earlier (page 9), total loess thickness on nearly level, un-eroded, upland areas varies from about 150 inches in the southwestern part of the county to about 40 inches in the northeastern part. The thickness of the loess deposits has an important bearing on the degree of leaching and profile development that has taken place in the soils. Upland soils in soil association O, which developed from less than 65 inches of loess, and association X, developed from less than 80 inches, are more highly leached of plant nutrients and more strongly developed than those in soil association H (developed from more than about 65 inches) and Q (developed from more than about 80 inches).

In the thinner loess area, where annual deposits were small, considerable leaching probably occurred during each year of loess deposition. Many of the readily soluble minerals were removed as fast as they were deposited. In the soils formed from thicker deposits, annual leaching may not have kept up with the deposition of lime carbonates and other minerals. This means simply that in the same period of time, soils formed

from thick loess deposits will not be developed as much as soils from thinner loess.

When deposited, the loess was predominantly of silt size and this is reflected in the silt loam texture of the A horizon. Weathering and the downward movement of fine materials in soils have increased the clay content of the B horizon in comparison with the parent loess.

Most areas of alluvial soils in Williamson county (soil association Z) are derived from sediment washed from weathered, upland soils. They are therefore acid and rather low in plant nutrients. The main soils of this character are Sharon, Belknap, and Bonnie silt loams.

The Beaucoup and Darwin soils (soil association Y), which are the main alluvial soils along the Big Muddy river, are strongly influenced by sediments from the lake-laid terrace area (soil association J) bordering the Big Muddy flood plain. Sediments and drainage waters from this terrace area are less acid than those from the upland soils and as a result Beaucoup and Darwin are not as strongly leached as Sharon, Belknap, and Bonnie.

The parent materials of soil association J are of Wisconsin age. The material is mainly clay, originally calcareous, covered by loess up to about 24 inches in thickness. The very fine clay texture has kept water from moving rapidly through the soil, and this in turn has resulted in relatively shallow leaching. Some coarser materials containing considerable sand were deposited in small areas near the break from the upper to the lower terrace level. The Camden and Starks soils have developed from these coarser, more permeable parent materials.

Sandstone bedrock is an important parent material on the steep, rocky slopes in soil associations Q and X, in the southern part of the county. These

slopes originally received loess deposits, but are so steep that practically all the loess has been removed by erosion. On many of the slopes part of the weathered sandstone has also been washed away, leaving thin soils and many rock outcrops. Although the soils in this area are predominantly sandy, there is some mixing of silt washed down from loess deposits higher up on the slopes.

Most sandstone of this area (1) is 95 percent or more  $\text{SiO}_2$  (silica), 1 to 2 percent  $\text{Al}_2\text{O}_3$ , and less than 1 percent  $\text{Fe}_2\text{O}_3$  by weight.  $\text{MgO}$  and  $\text{CaO}$  content is less than 0.1 percent and  $\text{K}_2\text{O}$  is less than 0.4 percent. The sandstones of this area, therefore, do not form particularly good parent materials for soils.

**Climate and vegetation.** Climate is important in soil development because it influences the type of vegetation growing on soils and also largely determines the type of weathering that takes place. The humid, temperate climate of Williamson county is conducive to the growth of forest, although prairie grass was still growing on several small areas (occupied by soil association P) at the time of settlement.

In general, soils developed under grass are darker colored and higher in organic matter than those developed under forest. When forest invades prairie, it takes some time, perhaps a few centuries, for the soil to lose organic matter to the point where that remaining can be maintained or stabilized under the forest cover. It is for this reason that some soils having good forest growth when first settled appear much darker than others. The areas of Marissa silt loam in soil association J, for example, are believed to have originally developed under grass. Forest later invaded these areas, but not long enough ago to completely obliterate some of the soil features for which the grass vegetation was responsible.

The humid, temperate climate and the forest vegetation that originally prevailed over most of Williamson county account for the predominant type of weathering in the county. In such a climate the decay of forest litter forms carbonic and other acids that increase the rate of leaching by downward-percolating water. Eventually the soils become highly acid and leached of most of the bases.

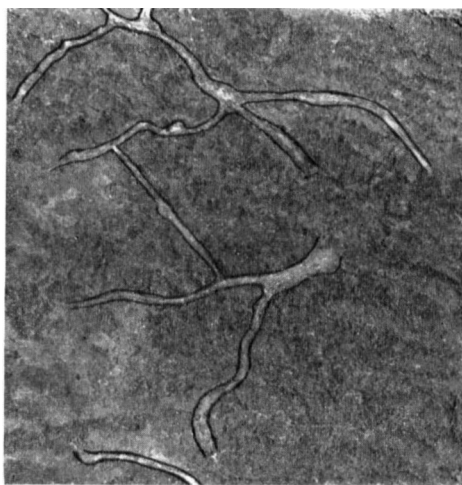
Clay and some iron and aluminum are removed from the A horizon and carried down into the B horizon, resulting in a well-developed solum. This translocation of materials is particularly pronounced on the more level-lying areas, and with time, the result is a very fine-textured B horizon or "claypan."

With climatic conditions like those in Williamson county, essentially the same type of weathering takes place under grass as under forest, and the end results are quite similar. Weathering under grass, however, is slower. Therefore, soils developed under the two types of vegetation differ more in the early and middle stages of development than in the later stages. It so happens that most of the soils of Williamson county are in the later stages of development. Differences resulting from the two types of vegetation are therefore less pronounced here than in central and northern Illinois. These differences, however, are still apparent in Williamson county. For example, Cisne, Hoyleton, and Richview (soil association P), which developed under grass, have under cultivation somewhat darker and thicker A<sub>1</sub> and A<sub>p</sub> horizons than Wynoose, Bluford, and Ava (soil association O), developed under forest. In the virgin or uncultivated state the A<sub>1</sub> is about the same color under the two types of vegetation, but it is much thicker under grass.

While the poorly drained soils of Williamson county under both types of

vegetation are either "claypan" soils or are developing in this direction, some other soils are developing fragipans or siltfans in the lower part of their profiles. These are moderately well-drained soils, formed under forest vegetation, that are undergoing a somewhat secondary stage of weathering. The Grantsburg, Hosmer, and Ava soils all have fragipans of varying degrees of development. Some recent work on fragipan soils in Illinois (6) gives general characteristics, field relationships, mineralogy, and micromorphology of the Hosmer.

The genesis of the fragipan in these soils is believed to be related to the stage of weathering, perhaps the texture of the parent material, and the depth to a temporary or perched water table. The fragipans of southern Illinois restrict root growth. They are very slowly permeable to water and when dry are very hard and brittle, appearing to be cemented. Upon wetting, however, the fragipans lose this hard, brittle consistency and if thoroughly wet slake down to a nonsticky or only slightly sticky mass. Whether the hardness and brittle-



Gray streaks surrounding large polygonal structure blocks in the fragipan in the lower part of a profile of Hosmer silt loam.

(Fig. 16)

ness are due to cementation by some chemical agent or merely dehydration of small amounts of clay between closely packed silt particles is not definitely known. The fragipans have very coarse prismatic structural blocks bounded by gray silty and clayey streaks or channels 1 to 2 inches wide. On a horizontal plane cut through the fragipan the large blocks bounded by the gray streaks form a polygonal pattern (Figure 16).

**Relief.** Under given climatic conditions and in uniform parent materials relief largely controls the amount of moisture in the soil. It influences the amount of runoff, infiltration, drainage water, and also the degree of erosion. The direction of slopes is of some importance. Because south-facing slopes receive direct rays from the sun, they have more evaporation and are generally drier than north-facing slopes.

In Williamson county many of the flat areas have received runoff from higher slopes. This, coupled with the normal rainfall, has brought about a high degree of soil development, causing much of the clay originally in the A horizons to move into the B horizons and form the "claypans" already mentioned. On the more sloping areas, part of the rainfall runs off, and with less water passing

through the profile, soil development has not proceeded quite as far. Soil horizons are not so strongly differentiated and chemical weathering has not been as severe. On quite steep slopes, where runoff is very rapid, geologic erosion or the removal of soil under natural conditions may almost keep pace with soil development. Soils on these slopes usually are thin and weakly developed.

**Time** as a factor in soil formation cannot be measured strictly in years. The length of time necessary for a certain soil to develop depends upon the other factors involved. An acid soil, for example, will develop much faster from parent materials low in lime than from materials very high in lime. Fine-textured parent materials which impede downward movement of water are leached free of lime much more slowly than are coarse-textured materials, other things being equal.

In general, soil development is faster in humid climates that support good vegetative growth than in dry climates supporting little vegetation.

On slopes where geologic erosion is great, soils may be in the early stages of development even though the slopes have been exposed to weathering for thousands of years.

### Grouping of Soils According to Soil-forming Factors

Various combinations of the five soil-forming factors just discussed have been operative in the different areas of the county. In Table 16 Williamson county soils are grouped according to parent materials and physiography, native vegetation, degree of development or degree of weathering, and natural soil drainage class. The general climate over the entire county is essentially the same.

As can be seen in Table 16, the soils of Williamson county belong to eight broad soil association areas. The location of these areas is shown in Figure 17. Also shown on this map are the major strip mine areas. Reclamation of strip mine spoil banks for pasture and forest production (Figure 18) varies with such factors as the acidity, texture, and rocky nature of the spoils (11).

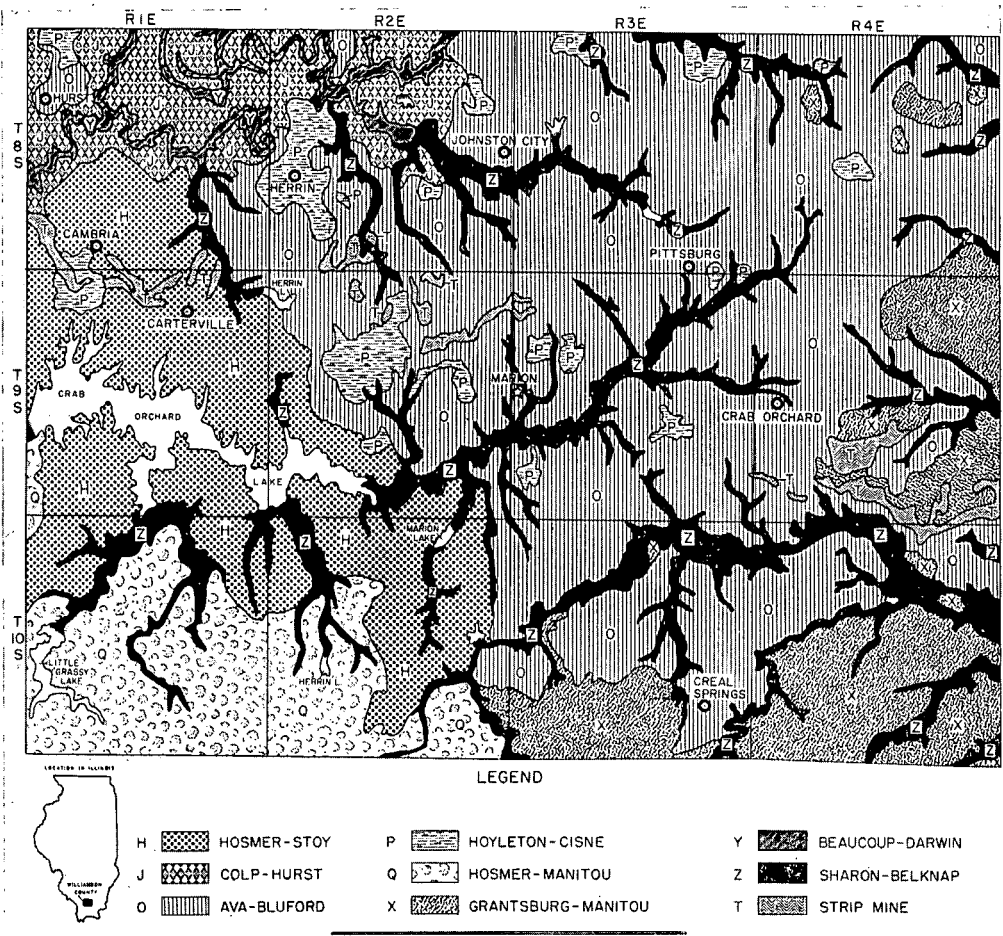


Table 16. — WILLIAMSON COUNTY SOILS: Grouped According to Parent Materials, Native Vegetation, and Natural Soil Drainage

Soil association and physiography	Parent material	Native vegetation	Degree of development		Poor
			Very poor		
<b>H</b> (Upland)	Loess (>65") on weathered till Till	Forest Forest	Moderately strong.... Moderately strong....	Weir (165) .....	Weir (165) .....
<b>J</b> (Terrace)	Loess (<24") on lake-bed clays	Forest	Moderately strong <14" to B <sup>b</sup> ..... >14" to B <sup>b</sup> .....	Okaw (84) .....	Okaw (84) Hurst (338) Marissa (176) .....
	Mixed sand, silt, and clay	Forest-grass <sup>a</sup> Forest	Moderate..... Moderate.....	.....	.....
<b>O</b> (Upland)	Loess (<65") on weathered till	Forest	Strong <24" to B <sup>b</sup> ..... >24" to B <sup>b</sup> .....	Loy (11) Racon (109) .....	Wynoose (12) Racon (109) .....
	Loess (<24") on weathered till Till	Forest Forest	Strong..... Moderately strong....	.....	.....
<b>P</b> (Upland)	Loess (<65") on weathered till	Grass	Strong <24" to B <sup>b</sup> ..... >24" to B <sup>b</sup> .....	Chauncey (287) .....	Cisne (2) Chauncey (287) .....
<b>Q</b> (Upland)	Loess (>80") on sandstone Loess (40-20") on sandstone Loess (20-10") on sandstone Sandstone	Forest Forest Forest Forest	Moderately strong.... Moderately strong.... Moderately strong.... Weak.....	.....	.....
<b>X</b> (Upland)	Loess (<80") on sandstone Loess (40-20") on sandstone Loess (20-10") on sandstone Sandstone	Forest Forest Forest Forest	Strong..... Moderately strong.... Moderately strong.... Weak.....	.....	.....
<b>Y</b> (Bottomland, slightly acid to neutral)	Light-colored silty clay loam Light-colored clay Moderately dark silty clay loam Moderately dark clay	Forest Forest Forest Forest	Weak..... Weak..... Weak..... Weak.....	Petrolia (288) Jacob (85) Beaucoup (70) Darwin (71) .....	Petrolia (288) Beaucoup (70) .....
<b>Z</b> (Bottomland, acid)	Light-colored silt loam	Forest	Weak.....	Bonnie (108) .....	Bonnie (108) .....

<sup>a</sup> "Forest-grass" indicates that forest has invaded a grassland area but has not yet entirely changed the soil features developed from the grassland.

<sup>b</sup> Depth to B or total thickness of A horizon assumes no or only slight erosion. Depth to B is not necessarily associated with one of the important differences between certain groups of soils.



Broad soil associations in Williamson county.

(Fig. 17)



Pine trees growing on strip mine spoil banks. They do best where spoils are somewhat leveled.

(Fig. 18)

## Taxonomic Classification of Williamson County Soils

In Table 17 the soils of Williamson county are classified into six categories: series, family, subgroup, group, suborder, and order. Category I, the soil type, is not included in Table 17. The soil types of Williamson county are described on pages 13 to 48.

Classification is based on profile characteristics and genesis without reference to geographic occurrence (9). Soils from several different soil association areas may be classified the same in the higher categories (groupings above soil type and soil series).

At the present time the soil classification system is being re-examined (16), and the system presented here is designed to fit into the new over-all scheme in so far as our present knowledge will permit. Soil type and the six categories in Table 17 are explained below. It will be noted from the following explanations that while soil characteristics or soil properties are the chief basis of classification, the soil characteristics having genetic significance tend to be emphasized more and more from Category V to Category VII inclusive.

**Soil type (Category I)** is the lowest category used in this report. It is the unit of classification with the least variation and is based on a consideration of more detailed characteristics or soil properties than any other category.

**Series (Category II).** The soil series differs from the soil type only in that texture of the surface soil is not considered. In other words, a soil series is divided into soil types on the basis of surface soil texture. A soil series is a group of soils that have developed from a particular kind of parent material and that have genetic horizons similar in differentiating characteristics and arrangement in the profile. These differentiating

characteristics include such morphological features as kind, thickness, and arrangement of horizons, as well as their color, structure, reaction, consistence, mineralogical and chemical composition, and texture below the A horizon.

The soil series is the lowest category in the taxonomic key, Table 17.

**Family (Category III).** Soil series are grouped into families which are nearly uniform in properties that affect the development of plant roots and the movement and retention of soil moisture. Many of the properties used for groupings in Category III are the same as those used in Category II, but they have a wider range in Category III. The main properties considered in Category III are texture of the B horizons, permeability, consistence, bulk density, and chemical composition of the solum below 6 inches; and soil depth class or thickness of the plant rooting zone. In the Williamson county taxonomic soil key texture of the surface soil is included also, although it is a basis for separation into soil types (Category I) rather than soil families.

**Subgroup (Category IV).** Families are combined into subgroups on the basis of kind and sequence of all horizons considered significant genetically.

Many of the subgroups represent the central concept of the groups discussed below. Other subgroups are somewhat intermediate between the central concept of various groups in Category V, and, therefore, are called intergrades between the groups of Category V.

**Group (Category V).** Groups are uniform in the kind and sequence of all significant horizons except those most apt to be destroyed by cultivation or lost by erosion. Groups are based on characteristics of horizons which are be-

Table 17. — TAXONOMIC KEY OF WILLIAMSON COUN-

Series (II)	Family (III)	Subgroup (IV)	Group (V)	
<b>Bonnie</b>	Silt loam sediments to 42" or more, slow permeability. pH < 5.8.	Light-colored, poorly and very poorly drained soils.	Soils with more than 5% alterable minerals and water content less than 125% of mineral and organic portion.	Soil long some with tics 20") 10Y 10Y with moti lack
<b>Petrolia</b>	Silty clay loam sediments to 42" or more, moderately slow permeability. pH > 5.8.			
<b>Jacob</b>	Clay sediments to 42" or more, very slow permeability. pH < 5.0.			
<b>Sharon</b>	Silt loam sediments to 42" or more, moderate permeability. pH < 5.8.	Light-colored, moderately well drained and well-drained soils.	Same as in Category VI and lacking evidence of a buried soil that is quite different from that of the upper 12 inches.	Soils mined liberate alwa rated iods Colo mas tied, if w nen
<b>Belknap</b>	Silt loam sediments to 42" or more, moderately slow permeability. pH < 5.8.	Light-colored, imperfectly drained soils, intergrades between poorly drained and well drained soils.		
<b>Steep rocky land</b> (A land type rather than a soil series)	Shallow solum soils (<10"), medium-textured material, D is sandstone.	Light-colored, well drained soils, intergrades to forest soils with textural B horizons.		
<b>Beaucoup</b>	Silty clay loam material to 42" or more, moderately slow permeability. pH > 5.8.	Moderately dark-colored, poorly and very poorly drained soils without textural B horizons.	Same as in Category VI and without textural B horizons.	Wetl zons at so year or y than less tied
<b>Darwin</b>	Silty clay to clay material to 42" or more, very slow permeability. pH > 5.8.			

\* See footnote, page 50.

Table 17. — Continued

Series (II)	Family (III)	Subgroup (IV)	Group (V)	
<b>Marissa</b>	Silt loam A, silty clay loam to silty clay B, silty clay or clay C, moderately slow to slow permeability.	Moderately dark-colored, imperfectly drained soils. Intergrades between moderately well-drained soils and light-colored, poorly drained soils developed under forest.	Same as in Category VI and with textural B.	Mod and text chro if sol or 1
	Silt loam A, silty clay loam to silty clay B, very slow permeability.	Light-colored, poorly and very poorly drained claypan soils developed under forest.	Soils with weak A <sub>1</sub> and abrupt textural change A to B, without irregular A to B boundary; with E* and slow to very slow permeability in E or B when saturated; without fragipan.	Soils char- chro- ties c- c- etic- lies i A <sub>1</sub> or the chro-
<b>Loy</b>	Silt loam A, silty clay loam to silty clay B, very slow permeability.	Poorly drained, grassland claypan soils. A <sub>1</sub> thicker and somewhat darker than A <sub>1</sub> or A <sub>p</sub> of forested claypans. Intergrades to dark-colored claypan soils.		
<b>Wynoose</b>	Silt loam A, silty clay loam to silty clay B, very slow permeability.	Light-colored, poorly drained soils lacking abrupt textural change from A to B of true claypan soils.	Soils with weak A <sub>1</sub> , without abrupt textural change from A to B, with E*, and without fragipan.	
<b>Racon</b>	Silt loam A, silty clay loam to silty clay B, very slow permeability.	Light-colored, moderately well drained and well-drained soils developed under forest and without fragipans (Note: Manitou sometimes has a weak fragipan).	Same as in Category VI and without fragipan or E* horizon, but with A <sub>2</sub> horizon.	Mod and textu- 6 or some with parts
<b>Okaw</b>	Silt loam A, silty clay loam to silty clay B, very slow permeability.			
<b>Cisne</b>	Silt loam A, silty clay loam to silty clay B, very slow permeability.			
<b>Chauncey</b>	Silt loam A, silty clay loam to silty clay B, very slow permeability.			
<b>Weir</b>	Silt loam A, silty clay loam to clay B, slow to very slow permeability.			
<b>Hurst</b>	Silt loam A, silty clay loam to clay loam B, sandy loam to loam C, moderate permeability.			
<b>Camden</b>	Silt loam A, silty clay loam to clay loam B, sandy loam to loam C, moderate permeability.			
<b>Hickory</b>	Loam to silt loam A, clay loam B, bulk density of C > 1.6, moderately slow permeability.			

\* See footnote, page 59.  
(Table 17 is continued on page 58.)

**Table 17. — Continued**

Series (II)	Family (III)	Subgroup (IV)	Group (V)
<b>Colp</b>	Silt loam A, silty clay to clay B, slow to very slow permeability.	(see page 57)	(see page 57)
<b>Manitou</b>	Silt loam A, silty clay loam B, solum 20-40" thick on sandstone rock or residuum.		
<b>Wellston</b>	Silt loam A, silty clay loam B, solum 10-20" thick on sandstone rock or residuum.		
<b>Starks</b>	Silt loam A, silty clay loam B, sandy loam to silt loam C, moderate permeability.	Light-colored, imperfectly drained soils. Intergrades between moderately well drained and poorly drained forest soils.	
<b>Blair Bluford Creal</b>	Silt loam A, silty clay loam to silty clay B, silty clay loam to clay loam C or D, slow to very slow permeability.	Light-colored, imperfectly drained soils. Intergrades between moderately well drained soils developed under forest and poorly drained claypan soils developed under forest.	
<b>Hoyleton Lukin</b>	Silt loam A, silty clay loam B, slow to very slow permeability.	Imperfectly drained grassland soils. Intergrades between moderately well drained soils developed under forest and poorly drained, dark-colored claypan soils.	

Table 17. — Concluded

Series (II)	Family (III)	Subgroup (IV)	Group (V)
<b>Richview</b>	Silt loam A, silty clay loam B, clay loam to silty clay loam C, slow to moderately slow permeability.	Moderately well-drained grassland soils. Intergrades between moderately well drained forest soils and moderately well drained grassland soils.	(see above)
<b>Ava Hosmer Grantsburg</b>	Silt loam A, silty clay loam B, moderately slow to slow permeability.	Light-colored, moderately well drained forest soils with E and fragipan.	Same as Category VI and with fragipan and tonguing of E* into B.
<b>Robbs Stoy</b>	Silt loam A, silty clay loam B, slow permeability.	Light-colored, imperfectly drained forest soils. Intergrades between moderately well drained forest soils with fragipans and poorly drained forest soils.	

\* An E horizon is a strongly developed (bleached) A<sub>2</sub> horizon in which the color is due primarily to the color of the iron oxides.

lieved to reflect processes of less genetic importance than those considered in Category VI, the next highest category. Genetically significant differences in the horizons themselves are also considered, such as the presence or absence of fragipans, hardpans, major differences in kinds of horizon boundaries, and color and thickness of A<sub>1</sub> horizons.

**Suborder (Category VI).** Suborders are uniform in characteristics which are most important genetically. Soils within a suborder have similarities in genesis and morphology of the main horizons. This means that they are similar in mineralogy and chemistry, degree of

gleying and soil moisture regimes, presence or absence of B horizons, and prominent accumulations of soluble materials.

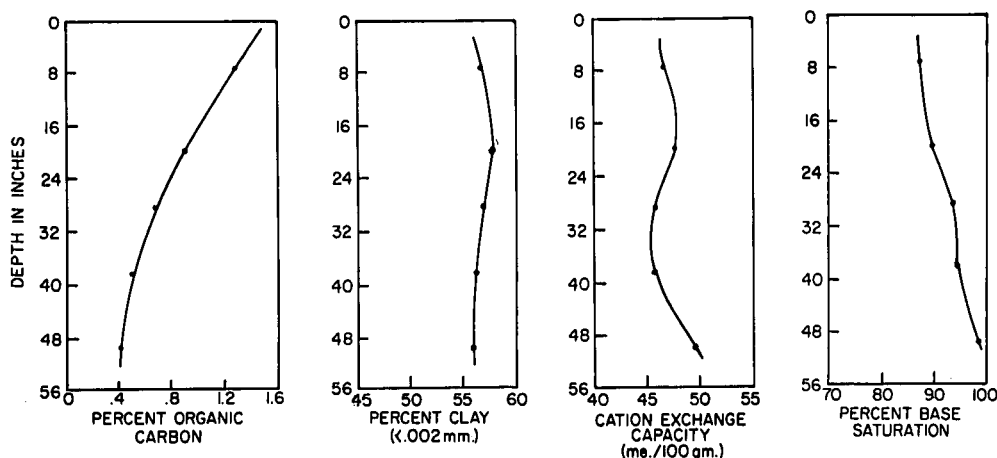
**Order (Category VII).** The orders are based on several critical horizons whose presence or absence provide a key either to lack of development or to the main soil-forming processes that have been active. Because of the importance of climate to soil formation, the orders are to some extent climatic zonal groups, and tend to have definite geographic ranges. If the critical horizons are B horizons, and two are present in the same solum, only the upper one is considered in Category VII.

### Some Chemical and Physical Characteristics of Soils Representing Six Subgroups in the Taxonomic Classification System

In Table 17, the soils of Williamson county are placed into 16 subgroups (Category IV). Selected chemical and physical properties of soils representing six of these subgroups are given in Figures 19, 20, and 21. These soils are also briefly discussed below. Additional data for each soil are given with the appropriate soil type description.

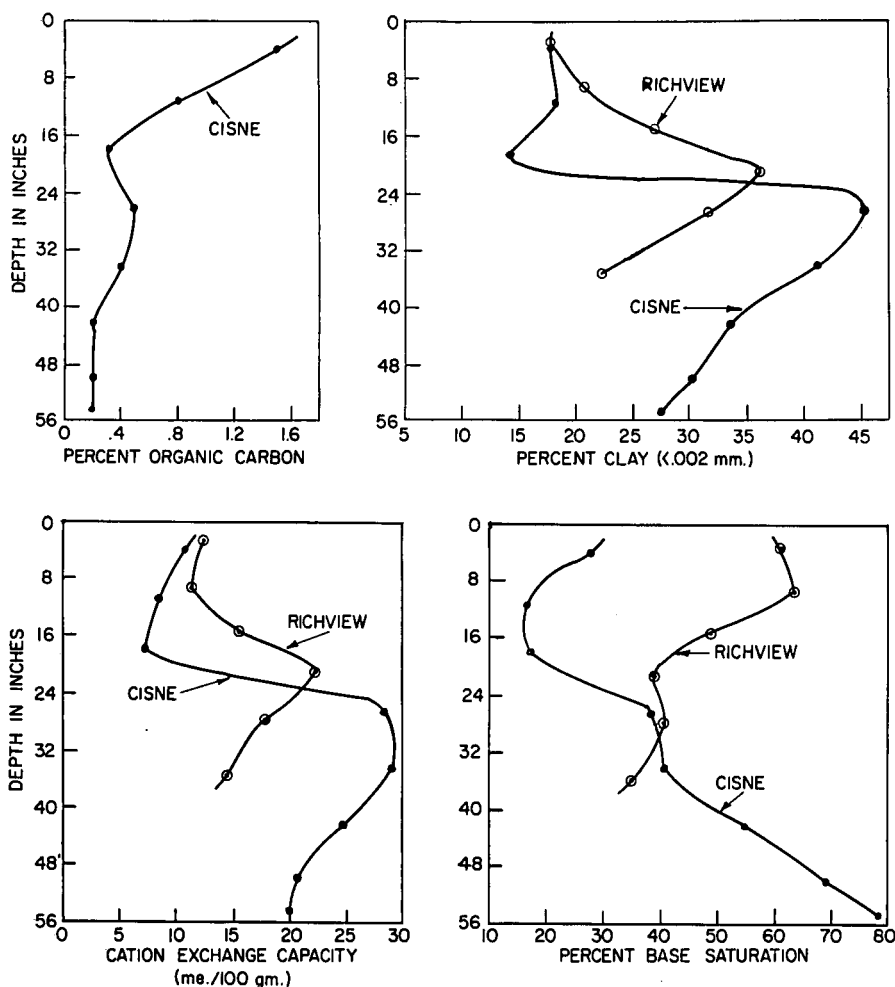
In Darwin, the percentage of clay (less than 2 microns) changes very little to a depth of 50 inches (Figure 19). Besides lacking a textural B horizon, Darwin has a high cation exchange capacity and high percent base saturation.

Cisne and Richview (Figure 20), are related genetically and are representative



Some chemical and physical properties of Darwin clay—a very poorly drained, moderately dark-colored, fine-textured soil without a textural B horizon. (Fig. 19)





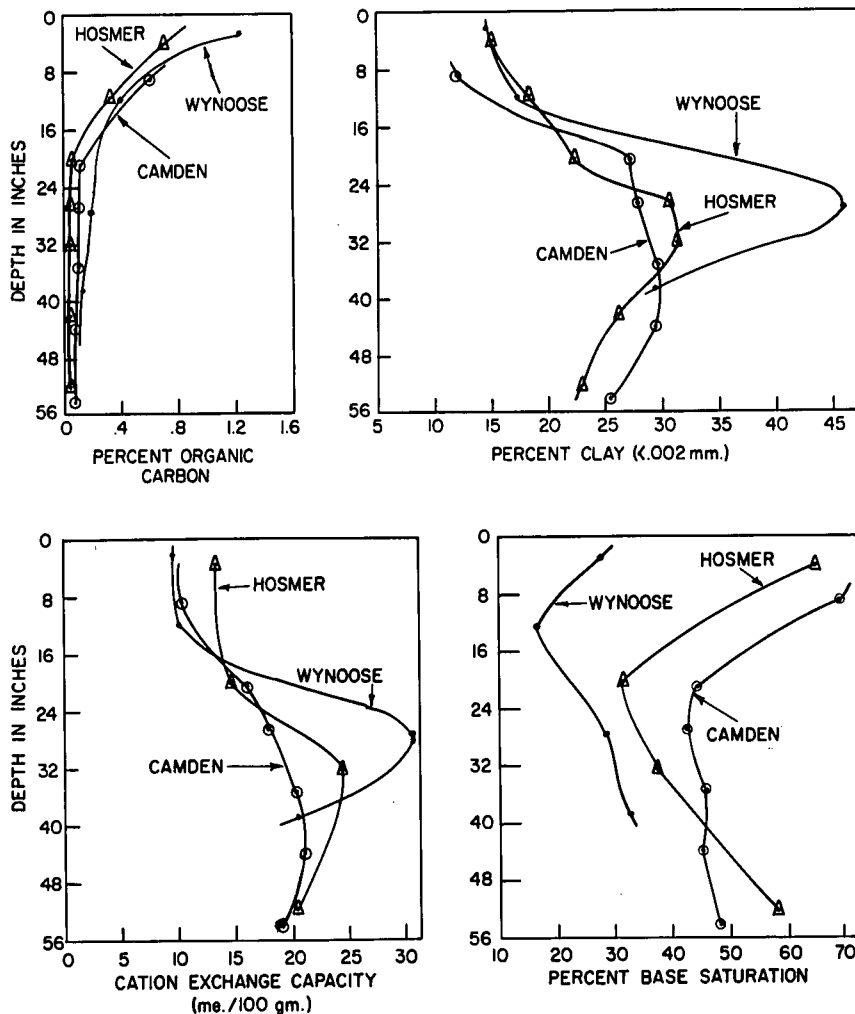
Some chemical and physical properties of Cisne and Richview silt loams. Cisne is a poorly drained claypan soil and Richview is moderately well drained. Both developed under grass, but Richview intergrades to forest soils. (Fig. 20)

of soils developed under grass. The differences between them are due largely to differences in the topography and natural drainage under which they developed. Richview is a moderately well-drained soil. Cisne, which developed on flatter areas, is a poorly drained soil with a pronounced claypan.

In Williamson county the chief differences between the two soils are that Cisne has a more abrupt textural change from the A to the B horizon and a greater maximum percentage of clay in the B than Richview. Because the B

horizon of Cisne has more clay, it has a higher cation exchange capacity. The fact that the A horizon of Richview has a greater percentage of base saturation than that of Cisne may be partly related to liming.

Wynoose, Camden, and Hosmer (Figure 21) are all light-colored soils developed under forest. Wynoose is very similar to Cisne in the distribution of clay in the profile, the cation exchange capacity, and the percent base saturation (Figures 20 and 21). There is less similarity between the two soils in the



Some chemical and physical properties of Wynoose, Camden, and Hosmer silt loams. Wynoose is considered representative of light-colored claypan soils developed under forest; Camden, of light-colored, moderately well drained and well-drained forest soils without fragipans; and Hosmer, of similar soils with fragipans. (Fig. 21)

organic carbon percentages. Cisne has a thicker and somewhat darker colored  $A_1$  horizon than Wynoose. Both soils have rather abrupt textural changes from the A to B horizon, which is typical of claypans.

Hosmer is a moderately well drained soil with a fragipan; Camden, without a fragipan, is moderately well drained to well drained. The clay distribution, the cation exchange capacity, and the percent base saturation of these two soils are

quite different than those of Wynoose. Camden has a somewhat higher base saturation than Hosmer above a depth of 36 inches, but differences due to the presence or absence of a fragipan in the lower B horizon are not apparent in the data given in Figure 21. The lower B horizon of Hosmer, because of the fragipan, is generally much less permeable to water, air, and plant roots than the lower B of Camden. The A and upper B of both soils are permeable.

Table 18.— SUMMARY OF RECOMMENDED ROTATIONS FOR WILLIAMSON COUNTY  
BY MAPPING UNIT AND TYPE OF CONSERVATION PRACTICE

Most intensive crop rotations recommended for listed mapping units <sup>a</sup>				
R-R-G-M <sup>b</sup>	R-R-G-M-M	R-R-G-M-M-M	R-G-M-M	G-M-M-M-M
No practice <sup>c</sup>				
2A, 3A, 11A, 12A, 13A, 70A, 71A, 72A, 108A, 109A, 132A, 134A, 164A, 165A, 167A, 176A, 287A, 288A, 335A, 337A, 338A, 382A, 14B, 122B, 134B, 176B, 214B, 301B.	3B, 4B, 13B, 14B, 164B, 167B, 214B, 335B, 337B.		3B, 4B, 13B, 14C, 14C, 122B, 134C, 134C, 134C, 164B, 214C, 214C, 301C, 301C.	3C, 3C, 4C, 4C, 4C, 5C, 5C, 5C, 14C, 122C, 122C, 134D, 134D, 164C, 164C, 214C, 214D, 214D, 301C.
Contouring				
3B, 4B, 13B, 14B, 14B, 122B, 134B, 164B, 167B, 176B, 214B, 214B, 301B, 335B, 337B.	3B, 4B, 13B, 14C, 14C, 122B, 134C, 134C, 134C, 164B, 214C, 214C, 301C, 301C.		3C, 4C, 4C, 5C, 5C, 122C, 122C, 134D, 164C.	3C, 4C, 5C, 5D, 8-14D, 8-214D, 14C, 14D, 14D, 122C, 122D, 134D, 164C, 214C, 214D, 214D, 301C, 301D, 339D, 340D.
Strip cropping				
		3B, 3B, 4B, 4B, 4C, 5C, 13B, 13B, 14B, 14B, 14C, 14C, 122B, 122B, 122C, 122C, 134B, 134C, 134C, 134C, 134D, 164B, 164B, 164C, 167B, 176B, 214B, 214B, 214C, 214C, 214C, 301B, 301C, 301C, 335B, 337B.	3C, 4C, 5C.	3C, 4C, 5C, 5D, 8-14D, 8-214D, 14C, 14D, 14D, 122C, 122D, 134D, 134E, 164C, 214D, 214D, 301C, 301D, 339D, 339D, 340D.
Terracing <sup>d</sup>				
3B, 3B, 3C, 4B, 4B, 4C, 4C, 5C, 5C, 13B, 13B, 14B, 14B, 14C, 14C, 122B, 122B, 122C, 122C, 134B, 134C, 134C, 164B, 164B, 164C, 167B, 176B, 214B, 214B, 214C, 214C, 301B, 301C, 301C, 335B, 337B.	134C, 134D.			3C, 4C, 5C, 5D, 14C, 14D, 14D, 122C, 122D, 134D, 134E, 164C, 214C, 214D, 214D, 301C, 301D.
Permanent cover, pasture, or woodland (above rotations do not apply)				
5D, 5D, 8D, 8E, 8F, 8F, 8G, 8G, 8-14D, 8-14D, 8-14E, 8-14E, 8-14F, 8-14F, 8-214D, 8-214D, 8-214E, 8-214E, 8-214F, 8-214F, 8-214G, 9E, 9F, 9F, 9G, 9G, 14D, 14D, 14D, 14E, 14E, 14E, 84A, 84A, 84B, 84B, 85A, 122D, 122D, 122E, 122E, 122F, 122F, 122G, 122G, 134E, 214D, 214E, 214E, 214E, 301D, 301D, 339D, 339D, 339E, 339E, 339F, 339F, 339G, 340D, 340D, 340E, 340E, 340F, 340F.				

<sup>a</sup> A mapping unit consists of a soil type, of limited slope range and of limited range in total thickness of A horizon, having large enough area to be shown on the soil map (page 65).

<sup>b</sup> R = row crop; G = small grain; M = rotation hay or pasture; for example, an R-R-G-M rotation includes 2 years of row crops, 1 year of small grain crops; and 1 year of rotation hay or pasture in a 4-year period.

<sup>c</sup> An R-G-M-M-M-M rotation may be used with no conservation practice on mapping unit 122C.

<sup>d</sup> An R-G-M-M-M-M rotation may be used with terracing on mapping units 8-14D, 8-214D, and 340D, although permanent cover, pasture, or woodland is generally recommended for these units.

INTERPRETIVE GROUPINGS OF SOILS FOR SPECIFIC PURPOSES

Grouping of Mapping Units According to Recommended  
Crop Rotations and Land Use

Some of the most important soil-management problems and the main crops grown on each soil are mentioned briefly in the soil type descriptions (pages 13 to 48). Slope and degree of erosion, as well as the soil type, need to be considered for detailed farm planning, including choice of land use and

Table 19. — AVERAGE YIELDS OF CROPS ON WILLIAMSON COUNTY SOILS  
UNDER A HIGH LEVEL OF MANAGEMENT<sup>a</sup>

Type No.	Type name	Hybrid corn	Soy-beans	Wheat	Winter oats <sup>b</sup>	Alfalfa hay	Mixed pasture
		<i>bu.</i>	<i>bu.</i>	<i>bu.</i>	<i>bu.</i>	<i>tons</i>	<i>days<sup>c</sup></i>
2	Cisne silt loam.....	<b>69</b>	<b>30</b>	<b>30</b>	55	2.5	120
3	Hoyleton silt loam.....	<b>69</b>	<b>29</b>	<b>32</b>	58	2.6	125
4	Richview silt loam.....	64	27	29	54	2.6	125
5	Blair silt loam.....	50	20	22	42	2.3	110
8	Hickory loam.....	N	N	18	30	1.7	80
8-14	Hickory loam-Ava silt loam complex	N	N	19	32	2.0	95
8-214	Hickory loam-Hosmer silt loam complex.....	N	N	20	35	2.2	105
9	Steep rocky land, sandstone material	N	N	N	N	N	20
11	Loy silt loam.....	54	22	24	45	2.0	95
12	Wynoose silt loam.....	<b>58</b>	<b>25</b>	<b>27</b>	50	2.4	115
13	Bluford silt loam.....	<b>62</b>	<b>28</b>	<b>29</b>	54	<b>2.5</b>	120
14	Ava silt loam.....	<b>60</b>	26	<b>27</b>	52	<b>2.5</b>	120
70	Beaucoup silty clay loam.....	<b>65</b>	30	33	55	2.8	135
71	Darwin clay.....	<b>50</b>	24	23	45	<b>2.5</b>	120
72	Sharon silt loam.....	<b>70</b>	30	31	55	3.2	155
84	Okaw silt loam.....	N	N	17	28	1.5	80
85	Jacob clay.....	N	N	15	25	1.3	75
108	Bonnie silt loam.....	55	26	<b>25</b>	45	2.5	120
109	Racoon silt loam.....	<b>65</b>	27	<b>28</b>	54	2.6	125
122	Colp silt loam.....	58	24	26	50	2.5	120
132	Starks silt loam.....	80	32	32	64	2.6	125
134	Camden silt loam.....	75	31	31	62	2.8	135
164	Stoy silt loam.....	<b>69</b>	30	<b>30</b>	60	<b>2.7</b>	130
165	Weir silt loam.....	64	28	27	55	2.5	120
167	Lukin silt loam.....	74	30	<b>34</b>	60	3.0	145
176	Marissa silt loam.....	78	32	34	64	3.2	155
214	Hosmer silt loam.....	67	28	28	58	2.7	130
287	Chauncey silt loam.....	74	31	32	58	2.8	135
288	Petrolia silty clay loam.....	56	<b>25</b>	23	50	2.6	125
301	Grantsburg clay loam.....	58	24	26	52	2.5	120
335	Robbs silt loam.....	59	25	26	54	2.5	120
337	Creal silt loam.....	68	29	30	58	2.7	130
338	Hurst silt loam.....	56	25	27	50	2.4	115
339	Wellston silt loam.....	N	N	N	N	1.5	80
340	Manitou silt loam.....	55	22	24	48	2.0	95
332	Belknap silt loam.....	60	28	28	50	2.8	135

<sup>a</sup> Yields are for uneroded or only slightly eroded conditions; yields from bottomlands assume no damage from flooding. N means crop not adapted. Yields in **bold face** are based on experiments by the Illinois Agricultural Experiment Station and long-time records kept by farmers in cooperation with the Department of Agricultural Economics; the others are estimated yields. A high level of management includes intensive and near optimum application (under present conditions) of the following management practices: adequate drainage, timely use of good cultural practices, careful handling of manure, the use of limestone, phosphate, and potash as soil tests indicate, and the use of a cropping system which retards erosion and helps to maintain good tilth and the nitrogen supply. Optimum levels of nitrogen are maintained by the use of additional nitrogen fertilizers where necessary.

<sup>b</sup> Although winter oats occasionally fail because of winter freezing, they produce higher yields than spring oats over a period of years in Williamson county.

<sup>c</sup> Estimated number of days that one acre will carry one cow.

crop rotations. As mentioned earlier (page 4), specific recommendations for each mapping unit (combination of soil type, slope, and degree of erosion or total thickness of A horizon) are given in the Williamson county soil management guide (5).

These recommendations are summarized in Table 18, which gives land use and crop rotations with and without various conservation practices. The mapping units given in Table 18 are those shown on the assembled soil map accompanying this report. They are fewer in number than the mapping units shown on the field photographs accompanying the soil management guide. It was necessary to combine some of the mapping units to show them on the small-scale soil map. The combinations involved only the degree of erosion and were made as follows: The "0" and "1" erosion areas were combined and labeled with the soil type number and slope

letter alone. The "2" erosion areas were unchanged and labeled with the soil type number and slope letter, with a bar above the letter; and "3" and "4" erosion areas of the same soil type and slope group were combined and labeled with the soil type number and slope letter, with a bar below the letter. The complete soil type, slope, and erosion legend is shown on each sheet of the soil map.

Seven rotations are recommended in Table 18. Two of them—the R-G-M-M-M and the R-G-M-M-M-M—are of minor importance and are referred to only in footnotes. The other five rotations are arranged from left to right in order of increasing protection against soil losses. They are the most intensive that can be used and still keep soil losses within reasonable limits. Less intensive rotations may of course be used. Rotations having greater percentages of grass and legumes are often more desirable,

Table 20. — ANNUAL ACRE YIELDS — BROWNSTOWN SOIL EXPERIMENT FIELD, CHIEFLY CISNE (2) AND HOYLETON (3) SILT LOAMS WITH SOME HUEY SILT LOAM (120)  
8-year Average, 1949-1956, Series 100-400

Treatment <sup>a</sup>	Corn	Soybeans	Wheat	Mixed hay
	<i>bu.</i>	<i>bu.</i>	<i>bu.</i>	<i>tons</i>
0.....	22 ± 4.0 <sup>b</sup>	13 ± 1.4 <sup>b</sup>	4 ± 1.4 <sup>b</sup>	.1 ± .04 <sup>b</sup>
N <sub>2</sub> .....	26 ± 6.4	15 ± 1.9	4 ± 2.2	.4 ± .13
P <sub>2</sub> .....	29 ± 3.7	14 ± 1.9	11 ± 3.2	.3 ± .12
K <sub>2</sub> .....	22 ± 3.5	14 ± 1.8	3 ± 1.3	.2 ± .06
L.....	39 ± 3.5	17 ± 1.5	17 ± 4.2	1.3 ± .26
N <sub>2</sub> P <sub>2</sub> .....	24 ± 4.5	13 ± 1.6	10 ± 2.8	.5 ± .13
N <sub>2</sub> K <sub>2</sub> .....	13 ± 2.3	11 ± 1.3	1 ± 0.4	.3 ± .09
P <sub>2</sub> K <sub>2</sub> .....	31 ± 9.1	14 ± 1.7	10 ± 3.5	.3 ± .09
LN <sub>2</sub> .....	42 ± 6.1	18 ± 1.8	14 ± 3.6	1.2 ± .17
LP <sub>2</sub> .....	46 ± 7.1	18 ± 2.0	26 ± 5.9	1.7 ± .25
LK <sub>2</sub> .....	65 ± 10.2	22 ± 2.2	20 ± 4.8	1.6 ± .25
N <sub>2</sub> P <sub>2</sub> K <sub>2</sub> .....	44 ± 7.4	18 ± 2.4	21 ± 5.1	.5 ± .14
LN <sub>2</sub> P <sub>2</sub> .....	49 ± 4.7	18 ± 2.0	31 ± 6.2	1.7 ± .24
LN <sub>2</sub> K <sub>2</sub> .....	66 ± 8.0	22 ± 2.3	20 ± 4.7	1.6 ± .24
LP <sub>2</sub> K <sub>2</sub> .....	69 ± 10.6	23 ± 2.3	28 ± 5.3	2.3 ± .16
LN <sub>2</sub> P <sub>2</sub> K <sub>2</sub> .....	75 ± 8.6	25 ± 3.1	40 ± 7.0	2.3 ± .23

<sup>a</sup> 0 = no treatment; N<sub>2</sub> = ammonium nitrate—40 lb. on wheat and 80 lb. on corn; P<sub>2</sub> = superphosphate—200 lb. drilled with wheat and 200 lb. broadcast on corn; K<sub>2</sub> = muriate of potash—200 lb. on corn and 200 lb. on wheat; L = limestone—4 tons 1940-1942 and 2 tons 1948-1949.

<sup>b</sup> Standard error of mean,  $SEm = \frac{SEx}{\sqrt{n}}$ . The standard error of a mean indicates the variability of sample means around the true mean, and hence the reliability of the observed mean. On the basis of 8 annual crop yields included in each mean, the true mean would be expected to fall within ± 2.3 SEm approximately 95 percent of the time. The standard error of the mean is also useful in judging the significance of differences between two means. If the actual difference between two means is greater than 3 times the larger SEm of the means being compared, the difference is probably significant.

especially if livestock can utilize the roughage to advantage.

Permanent cover of pasture or woodland, rather than a rotation, is recommended for a large number of mapping units. Most of them are strongly sloping and eroded, but a few, such as 84A, 84B, and 85A, are most suitable for pasture or woodland because of unfavorable soil characteristics.

**Yields of crops and timber.** Average yields of crops under a high level of

management are given in Table 19. A footnote to the table lists the management practices under which these yields can be expected. The yields are based on current information. In time, with improvements in soil technology, crop varieties, and farming techniques, yields can be expected to reach higher levels.

Yields obtained on the Brownstown, Ewing, and Dixon Springs soil experiment fields are given in Tables 20, 21, and 22 respectively. These tables strik-

**Table 21. — ANNUAL ACRE YIELDS — EWING SOIL EXPERIMENT FIELD, CHIEFLY CISNE SILT LOAM (2) AND HOYLETON SILT LOAM (3)**

8-year Average, 1949-1956, Series 100-400

Treatment <sup>a</sup>	Corn	Soybeans	Wheat	Mixed hay
	<i>bu.</i>	<i>bu.</i>	<i>bu.</i>	<i>tons</i>
0.....	10 ± 2.0 <sup>b</sup>	7 ± 1.3 <sup>b</sup>	.7 ± 0.4 <sup>b</sup>	0
M.....	36 ± 2.8	10 ± 1.5	5 ± 2.0	0
ML.....	65 ± 5.5	17 ± 2.9	20 ± 3.2	1.6 ± .35 <sup>b</sup>
MLP.....	66 ± 5.8	15 ± 2.9	24 ± 4.6	1.8 ± .34
0.....	19 ± 1.4	8 ± 1.4	1.8 ± 0.9	0
R.....	30 ± 3.8	10 ± 1.8	5 ± 1.6	.1 ± .03
RL.....	42 ± 8.2	12 ± 2.3	15 ± 3.1	.9 ± .19
RLP.....	49 ± 9.1	12 ± 2.6	19 ± 3.2	1.2 ± .20
RLK.....	65 ± 5.5	17 ± 3.1	16 ± 3.0	1.1 ± .19
RLPK.....	77 ± 5.4	19 ± 3.5	21 ± 3.0	1.7 ± .28
RLPK (0-10-20).....	75 ± 5.0	18 ± 3.3	29 ± 4.4	2.1 ± .34

<sup>a</sup> 0 = no treatment; M = manure—1 ton for each ton of crops removed; R = crop residues—stover, straw, legumes; L = limestone—6 applications for total of 16 tons since 1910; P = rock phosphate—4 applications for total of 4 tons since 1910; K = muriate of potash—332 lb. per rotation (166 lb. on wheat and 166 lb. on corn); 0-10-20—1,000 lb. per rotation (500 lb. on wheat and 500 lb. on corn).

<sup>b</sup> See footnote b, Table 20.

**Table 22. — ANNUAL ACRE YIELDS — DIXON SPRINGS PLOTS, CHIEFLY GRANTSBURG SILT LOAM (301) WITH SOME ROBBS SILT LOAM (335)**

8-year Average, 1950-1957, Series 500-800

Treatment <sup>a</sup>	Corn	Wheat	Alfalfa-brome hay
	<i>bu.</i>	<i>bu.</i>	<i>tons</i>
0.....	12 ± 2.4 <sup>b</sup>	8 ± 2.0 <sup>b</sup>	.4 ± .19 <sup>b</sup>
L.....	33 ± 4.7	12 ± 1.6	.7 ± .28
LsP (0-20-0).....	45 ± 6.7	23 ± 2.5	1.2 ± .36
LK.....	33 ± 4.4	14 ± 1.9	.8 ± .31
LKrP.....	47 ± 6.1	21 ± 3.0	1.4 ± .42
LKsP (0-20-0).....	47 ± 7.0	24 ± 3.5	1.5 ± .38
LKP (fused).....	48 ± 8.4	25 ± 3.2	1.6 ± .46
LKP (meta).....	46 ± 7.5	20 ± 3.6	1.2 ± .39

<sup>a</sup> 0 = no treatment; L = limestone—800 lb. an acre annually; rP = rock phosphate—187 lb. an acre annually; sP = superphosphate (20 percent), 100 lb. an acre annually; P (fused) = fused rock phosphate—66 lb. an acre annually; P (meta) = metaphosphate—26 lb. an acre annually; K = muriate of potash—100 lb. an acre annually beginning in 1950.

<sup>b</sup> See footnote b, Table 20.

ingly show the need for and the large responses to complete fertilization, including limestone, on highly weathered soils such as occur on most of the uplands of Williamson county.

Trees adapted to Williamson county soils, together with their growth rates under good management, are given in Table 23. Good management for timber is defined in a footnote to that table.

Table 23.—TREES ADAPTED TO WILLIAMSON COUNTY SOILS  
Estimated Annual Growth Rates in Good Stands Under Good Management<sup>a</sup>

Type No.	Type name	Black oak, red oak, post oak	White oak, red oak, black oak, yellow poplar	Oak (wet site species), sweet gum, sycamore, cottonwood, soft maple, ash	Shortleaf and loblolly pine
<i>growth in board feet per acre</i>					
2	Cisne silt loam.....	100-120	...	...	...
3	Hoyleton silt loam.....	...	300	...	Do well
4	Richview silt loam.....	...	300	...	Do well
5	Blair silt loam.....	...	300	...	Do well
8	Hickory loam.....	...	150	...	Do moderately well
8-14	Hickory loam-Ava silt loam complex.....	...	250	...	Do moderately well
8-214	Hickory loam-Hosmer silt loam complex.....	...	300	...	Do moderately well
9	Steep rocky land, sandstone material <sup>b</sup> .....	...	...	...	...
11	Loy silt loam.....	100	...	...	...
12	Wynoose silt loam.....	100-200	...	...	Do fair
13	Bluford silt loam.....	...	300	...	Do well
14	Ava silt loam.....	...	500	...	Do well
70	Beaucoup silty clay loam.....	...	...	400-500	...
71	Darwin clay.....	...	...	400	...
72	Sharon silt loam.....	...	...	700-800	...
84	Okaw silt loam <sup>c</sup> .....	...	...	...	...
85	Jacob clay <sup>c</sup> .....	...	...	...	...
108	Bonnie silt loam.....	...	...	450	...
109	Racoon silt loam.....	200	...	...	...
122	Colp silt loam.....	...	300	...	Do well
132	Starks silt loam.....	...	350	...	Do well
134	Camden silt loam.....	...	500	...	Do well
164	Stoy silt loam.....	...	300	...	Do well
165	Weir silt loam.....	200	...	...	...
167	Lukin silt loam.....	...	300	...	Do well
176	Marissa silt loam.....	...	300	...	...
214	Hosmer silt loam.....	...	500	...	Do well
287	Chauncey silt loam.....	120	...	...	...
288	Petrolia silty clay loam.....	...	...	450	...
301	Grantsburg silt loam.....	...	450	...	Do well
335	Robbs silt loam.....	...	300	...	Do well
337	Creal silt loam.....	...	300	...	Do well
338	Hurst silt loam.....	100-200	...	...	...
339	Wellston silt loam.....	...	250	...	Do fair
340	Manitou silt loam.....	...	300	...	Do well
382	Belknap silt loam.....	...	...	500-600	...

<sup>a</sup> Good management includes harvesting mature, defective, and less desirable trees unless they are needed to provide vegetative cover for small, desirable species; and protection from fire and grazing to prevent damage to young trees and encourage growth of new ones.

<sup>b</sup> Red cedar, black oak, southern red oak, and post oak will yield about 100 board feet.

<sup>c</sup> Pin oak and gum do fairly well.

## Engineering Applications for Non-agricultural Purposes

Information useful in engineering is limited for the soils of Williamson county. The U. S. Bureau of Public Roads, however, has made tests on Belknap and Hosmer in Wabash county, and on Cisne in Perry county (Table 24). These three soils are representative of the soils on considerable areas of Williamson county.

Belknap, an imperfectly drained, silt loam bottomland soil, is intermediate in many characteristics between the moderately well-drained to well-drained Sharon and the poorly to very poorly drained Bonnie bottomland soils. Test results for Belknap would therefore be expected to represent average values for the acid, silt loam bottomland soils of Williamson county.

Hosmer, of wide extent itself, is representative of the moderately well-drained upland soils developed from loess, with fragipans (page 51) in the lower portion of their profiles. Engineering tests on Grantsburg would be expected to give results similar to those on Hosmer although Grantsburg has a more strongly developed fragipan. Likewise Ava has many similarities to Hosmer from an engineering standpoint. Ava differs from Hosmer principally in having weathered glacial till at shallower depths and in being a more highly leached and weathered soil.

Cisne is representative of the poorly drained claypan soils developed from thin loess over Illinoian till.

Although this report has been written chiefly from an agronomic standpoint, the engineer should find much of the information valuable, particularly the descriptions of the various soil types. The soil profile descriptions, as well as the mapping of soil types, are of necessity somewhat generalized. However, they should be useful in planning detailed field

surveys in the immediate area of an engineering construction project.

Of the several systems used by engineers to classify soils (17, 18), the one most commonly used is that approved by the American Association of State Highway Officials (AASHTO). In this system, seven main groups are recognized, ranging from A-1 (stone fragments, gravel, and sand) to A-4 (nonplastic to moderately plastic silty soils), A-6 (medium plastic clays), and finally A-7-6 (highly plastic clays). The numbers in parentheses following the soil group symbol in the AASHTO classification in Table 24 are group index numbers, which range from 0 for the best to 20 for the poorest soil material for engineering purposes within each of the seven main groups.

The unified soil classification system used by some engineers includes 15 classes — 8 considered as coarse-grained, 6 as fine-grained, and 1 as highly organic. In this system Belknap, Hosmer, and Cisne are all classified as fine-grained; that is, over 50 percent of the soil material passes the number 200 sieve. ML includes inorganic silts and very fine sands, rock flour, silty or clayey fine sands, and clayey silts of slight plasticity. CL includes inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, and lean clays. Both ML and CL have liquid limits below 50. MH includes inorganic silts, micaceous or diatomaceous fine sandy or silty soils, and elastic silts. CH includes inorganic clays of high plasticity and fat clays.

The various classes in both systems have general interpretations as to their value or rating for subgrade, foundation material, embankments, compaction, etc.

In earthwork, optimum stability is usually obtained if soil material is compacted to about maximum dry density when it is about at the optimum mois-



Table 24. — ENGINEERING TEST DATA FOR BELKNAP, HOSMER /

Soil type number, name, and description	Portion of range represented	Horizon and depth in inches from surface	Classification		Perce- pass- #10 sieve
			Unified	AASHO	
<b>382 Belknap silt loam</b> Silt loam with some sand and clay layers below 5 to 7 feet. Imperfectly drained bottomland soil on 0 to 1.5 percent slopes. Watertable variable—near surface in spring and below 5 feet in late summer.	Modal (imperfectly drained)  Low (imperfectly drained)  High (imperfectly drained)	A <sup>p</sup> (0-6)..... C (6-23)..... C (27-59).....  A <sup>p</sup> (0-7)..... C (7-17)..... C (17-40).....  A <sup>1</sup> (0-15)..... C (15-30)..... C (30-50).....	ML ML ML ML-CL ML ML ML-CL ML-CL ML-CL ML-CL	A-4(8) A-4(8) A-4(8)  A-4(8) A-4(8) A-4(6)  A-4(8) A-4(8) A-4(8)	100 100 100  100 100 100  100 100 100
<b>214 Hosmer silt loam</b> About 1 foot of silt loam over 2-2½ feet of fine silt loam to coarse silty clay loam underlain by silt loam. Fragipan common between 2½ and 4 feet. Moderately well drained upland soil with watertable near 3 feet in spring and below 10 feet in summer. Spring watertable is sometimes a perched watertable. Slopes range from 2 to 18 percent.	Modal (moderately well drained)  Low (moderately well drained)  Shallow to till	A <sup>p</sup> (0-6)..... B <sub>2</sub> (14-27)..... B <sub>3</sub> (38-60).....  A <sup>p</sup> (0-6)..... B <sub>2</sub> (20-34)..... C (34-43).....  A <sup>p</sup> (0-5)..... B <sub>2</sub> (5-15)..... D (35-45).....	ML-CL ML-CL ML-CL  ML CL CL  ML-CL CL CL	A-4(8) A-7-6(13) A-6(9)  A-4(8) A-7-6(18) A-6(12)  A-4(8) A-7-6(13) A-4(8)	100 100 100  100 100 100  100 100 100
<b>2 Cisme silt loam</b> About 1½ feet of silt loam over 2 to 3 feet of fine silty clay loam to coarse silty clay underlain by a silty clay loam to silty clay Illinoian till soil. Poorly drained upland soil with watertable near surface in spring and below 5 feet in late summer. Slopes range from 0 to 1½ percent.	Modal (poorly drained)  Better drained side of Cisme  Lighter colored and poorer drained side of Cisme	A <sub>2</sub> (8-21)..... B <sub>2</sub> (21-39)..... C (44-55).....  A <sub>2</sub> (8-15)..... B <sub>2</sub> (15-26)..... B <sub>3</sub> (26-39)..... C (39-58).....  A <sub>2</sub> (7-17)..... B <sub>2</sub> (17-33)..... C (43-59).....	ML-CL MH-CH CL  ML-CL MH-CH CL CL  ML-CL CH CL	A-4(8) A-7-6(19) A-7-6(16)  A-4(8) A-7-6(20) A-7-6(14) A-6(9)  A-4(8) A-7-6(18) A-7-6(15)	100 100 100  100 100 100 100  100 100 100

<sup>a</sup> Percent clay by hydrometer method.

<sup>b</sup> NP means nonplastic.

ture content. This is the moisture content at which maximum compaction is reached with a constant compaction force. Compaction decreases as moisture content either decreases or increases from the optimum. Maximum dry density is the maximum weight, in pounds per cubic foot, of oven-dry soil which can be obtained with specified compaction effort. The values presented in Table 24 were obtained according to AASHTO standard test procedures.

The liquid limit and the plastic limit tests give the range in moisture over which a soil is in the plastic state of consistency. The numerical difference between the liquid and the plastic limit is known as the plasticity index.

The liquid limit is defined as that moisture content (percent moisture by weight on oven-dry basis) at which the soil passes from the plastic to the liquid state, or at which the soil will just begin to flow when jarred slightly.

The plastic limit is defined as that moisture content at which cohesive soils pass from the semi-solid to the plastic state. It is the lowest moisture content (percent moisture by weight on oven-dry basis) at which a soil can be rolled by the hand into a thread  $\frac{1}{8}$  inch in diameter without crumbling.

With the above definitions in mind the three soils for which engineering test data are given in Table 24 would be characterized from an engineering standpoint as follows:

Belknap is a fine-grained bottomland soil (mostly silt), low in organic matter and having slight or low plasticity and fair to poor drainage. Because it is apt to contain soft, compressible layers, it is fair to poor foundation material and should be investigated thoroughly before foundations for heavy structures are built. Belknap is poor to unsuitable subgrade material, with poor stability

in embankments and generally poor compaction characteristics. It can be used for embankments if moisture is closely controlled in compaction with a pneumatic-tire or sheepsfoot roller. Flooding occurs at irregular intervals on Belknap, and footings of foundations are often at or below the water table.

Hosmer is also a fine-grained soil low in organic matter. The upper 12 to 15 inches are a silt loam with similar percentages of silt and clay as in Belknap. Test data indicate that the 0-6 inch layer of Hosmer would have engineering properties very similar to those of Belknap. The B horizon (middle layers) of Hosmer contains more clay and less silt than either the A horizon or the C horizon (lower layers) and is therefore a better binder material having a higher liquid limit and plasticity index. The B horizon would be rated fair foundation material for many structures such as homes or single-story buildings. However, for major structures, detailed investigations should be made at the site to determine the variations in the character of the underlying material. The B horizon is poor or unsuitable subgrade material, stable embankment material suitable for use in impervious cores and blankets, and fair to good for compaction with pneumatic-tire or sheepsfoot roller. It would be rated as practically impervious to drainage when compacted. The lower layers of Hosmer (generally C horizon) have ratings somewhat intermediate between those of the A (upper 12 to 15 inches) and the B horizons.

Cisne, like Belknap and Hosmer, is a fine-grained soil low in organic matter. It is poorly drained. The A horizon has slight or low plasticity and is fair to poor foundation material. Thorough investigations should be made before it is used as foundation material for heavy

structures. It is poor subgrade material and has only fair stability in embankments. Compaction characteristics are about fair, but close control of moisture in compaction is essential. The B horizon is high in clay and has high plasticity and a liquid limit greater than 50 percent. It is poor to very poor foundation material for heavy structures, and in general, is not suitable for subgrade material. It has poor to fair stability in embankments and fair to poor compaction characteristics. The C horizon of Cisne contains less clay than the B. It has fair to good compaction characteristics and stability in embankments. It

can be used as impervious cores and blankets. In general, the C horizon is fair to poor for foundation material and generally not suitable as subgrade material.

Small structures should find adequate bearing in the B or preferably in the C horizon of Cisne. There is some possibility of expansion or contraction of the B horizon material, which may cause differential movements in the structure. Major structures will probably find adequate bearing in the unweathered portion of the underlying drift. However, soil exploration at the site is essential for proper design of heavy structures.

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\*\* Reports 74 for Iroquois county and No. 72 for Livingston county replace Nos. 22 and 25 previously published for these two counties.

Much new information about soils has been obtained since the older soil maps and reports in the above list were printed, especially Nos. 1 to 53 issued before 1933. For many areas this newer information is necessary if the maps and other soil information in the reports are to be correctly interpreted. Help in making these interpretations can be obtained by writing Department of Agronomy, University of Illinois, Urbana.

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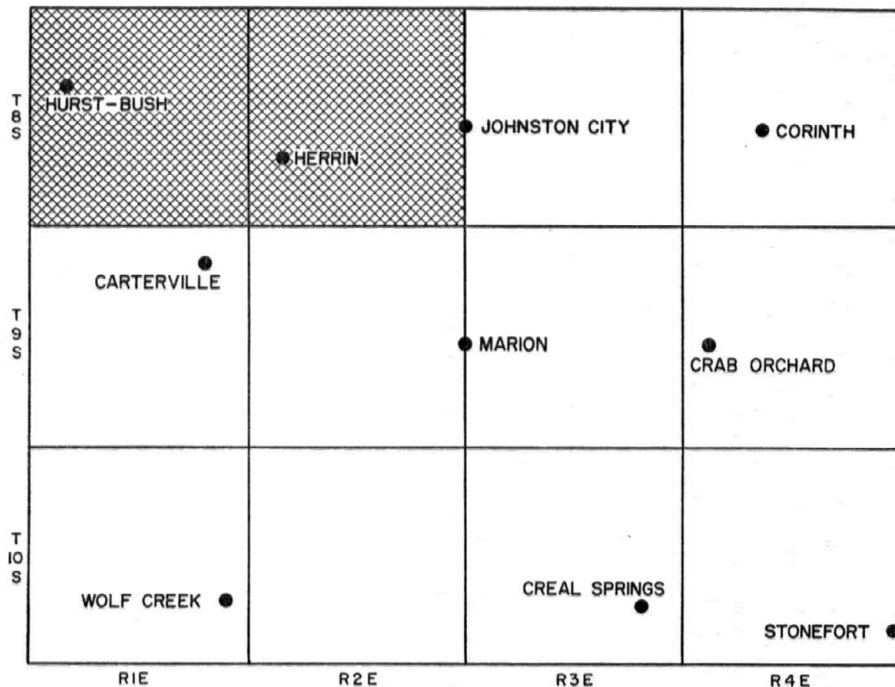
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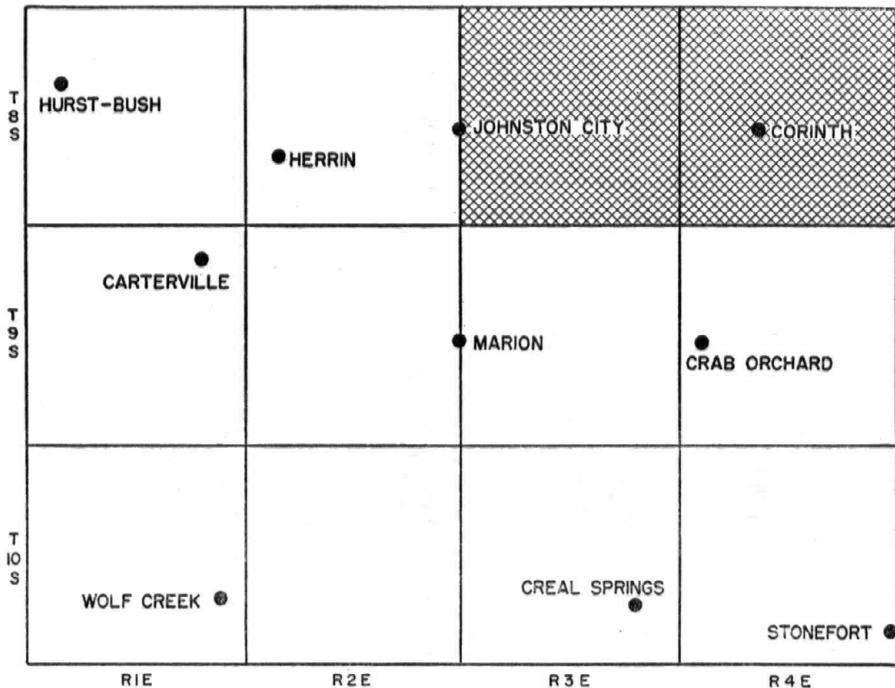


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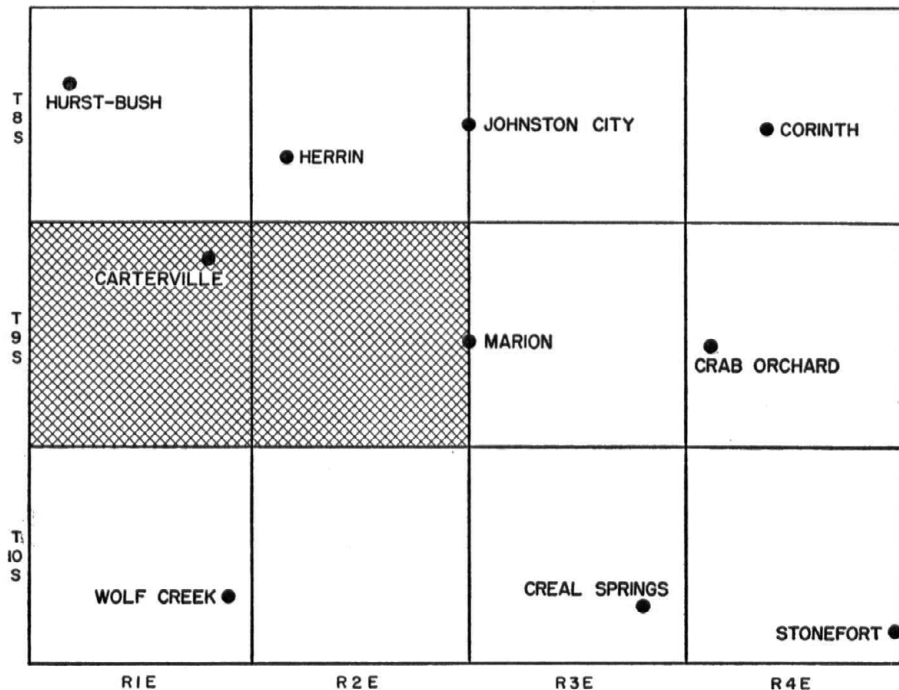
## WILLIAMSON COUNTY SOIL MAP

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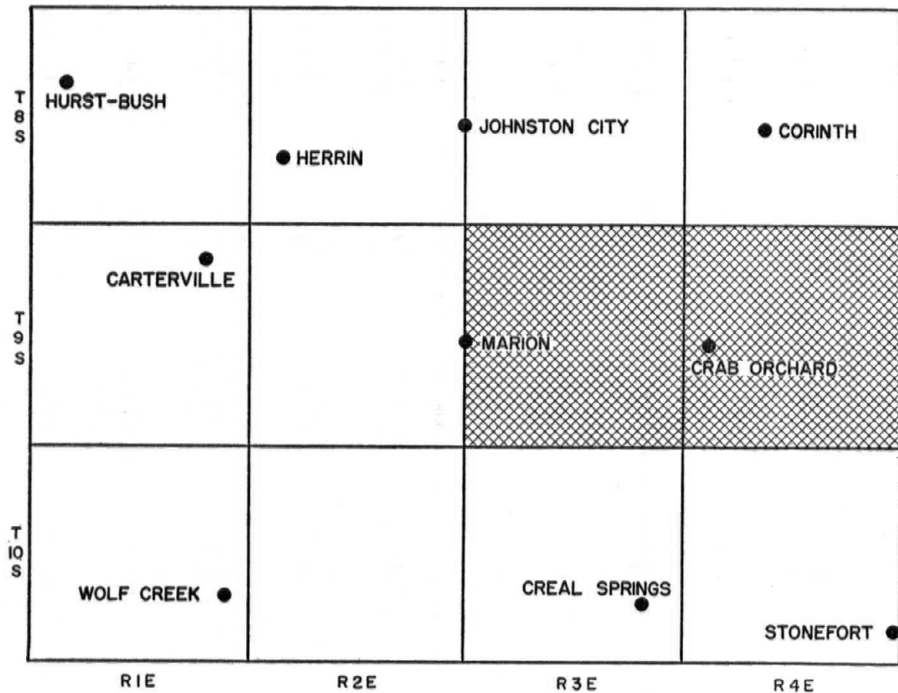
## WILLIAMSON COUNTY SOIL MAP

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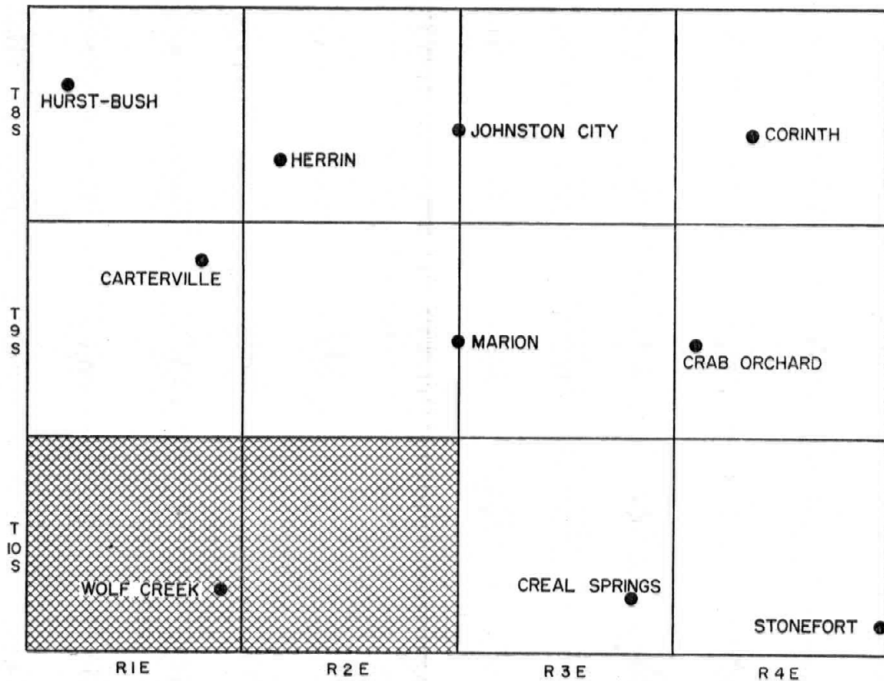
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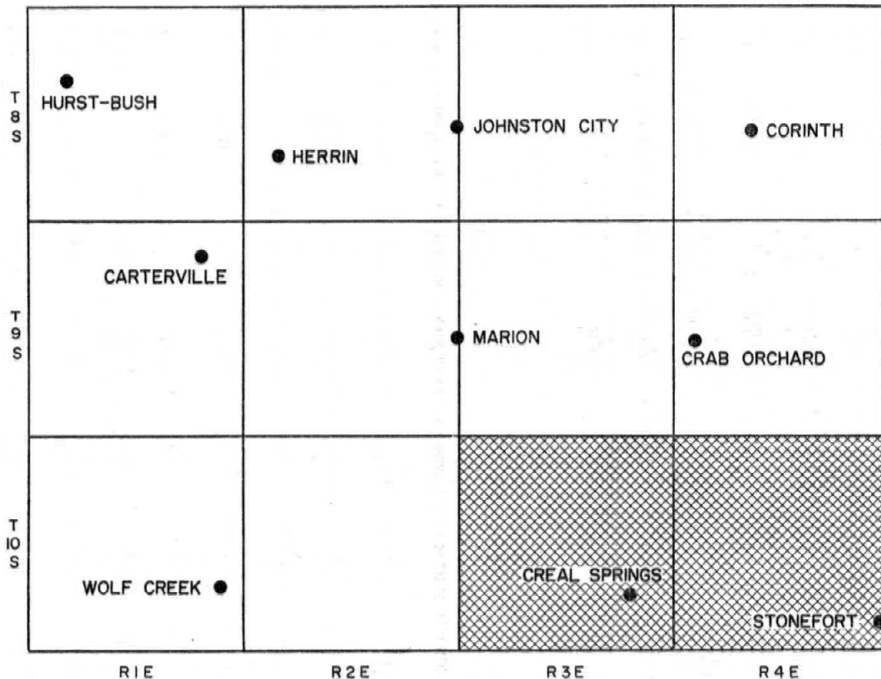
## WILLIAMSON COUNTY SOIL MAP

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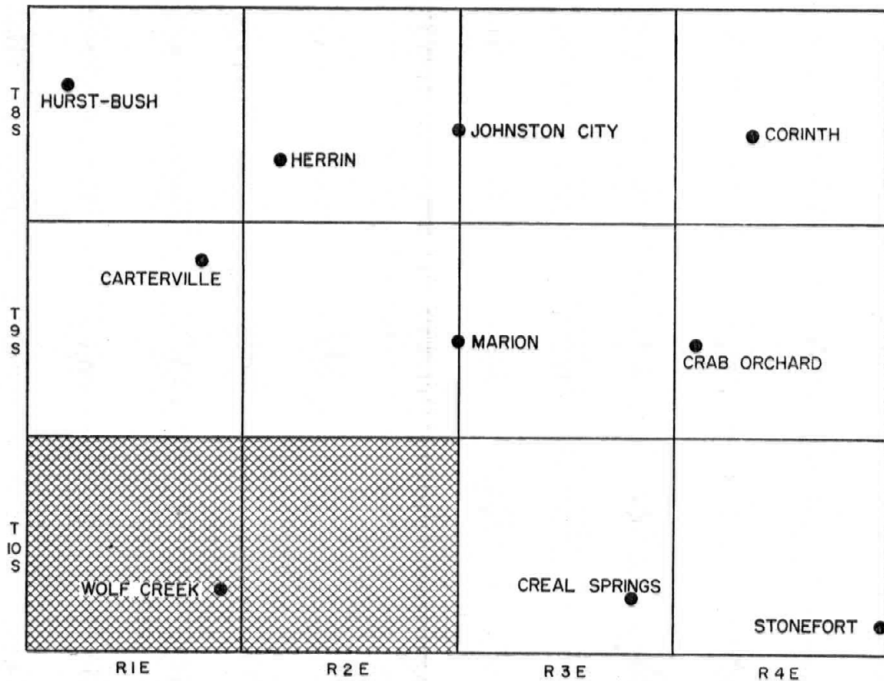
WILLIAMSON COUNTY SOIL MAP

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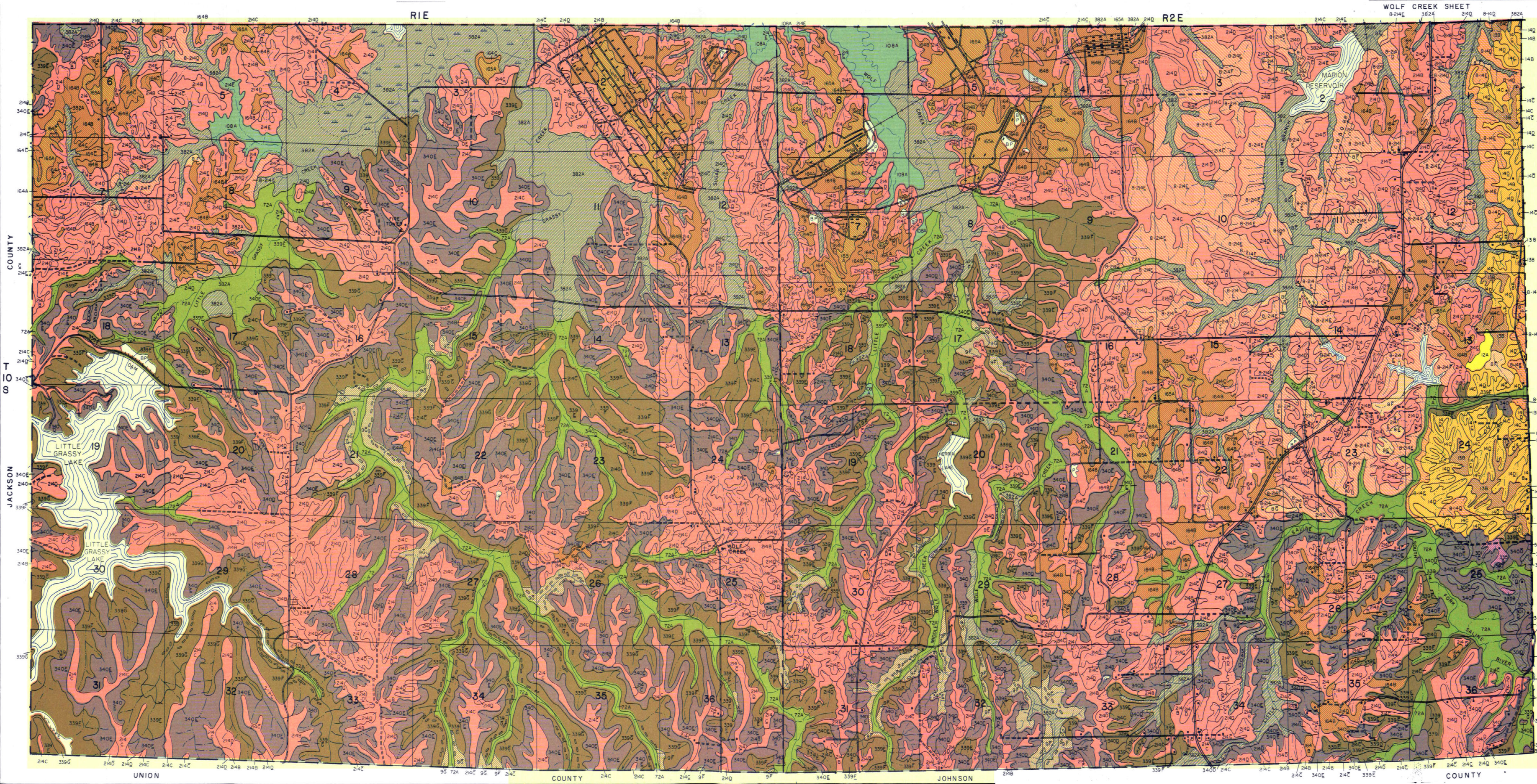
## WILLIAMSON COUNTY SOIL MAP

# WOLF CREEK SHEET



WILLIAMSON COUNTY SOIL MAP





# SOIL TYPES

2	CISNE SILT LOAM	70	BEAUCOUP SILTY CLAY LOAM, BOTTOM	167	LUKIN SILT LOAM
3	HOYLETON SILT LOAM	71	DARWIN CLAY, BOTTOM	176	MARISSA SILT LOAM
4	RICHVIEW SILT LOAM	72	SHARON SILT LOAM, BOTTOM	214	HOSMER SILT LOAM
5	BLAIR SILT LOAM	84	OKAW SILT LOAM	287	CHAUNCEY SILT LOAM
8	HICKORY LOAM	85	JACOB CLAY, BOTTOM	288	PETROLIA SILTY CLAY LOAM
8-14	HICKORY LOAM-AVA SILT LOAM, COMPLEX	106	BONNIE SILT LOAM, BOTTOM	301	GRANTSBURG SILT LOAM
8-214	HICKORY LOAM-HOSMER SILT LOAM, COMPLEX	109	RACCOON SILT LOAM	335	ROBBS SILT LOAM
9	STEEP ROCKY LAND, SANDSTONE MATERIAL	122	COLP SILT LOAM	337	CREAL SILT LOAM
11	LOY SILT LOAM	132	STARKS SILT LOAM	338	HURST SILT LOAM
12	WYNOOSE SILT LOAM	134	CAMDEN SILT LOAM	339	WELLSTON SILT LOAM
13	BLUFORD SILT LOAM	164	STOY SILT LOAM	340	MANITOU SILT LOAM
14	AVA SILT LOAM	165	WEIR SILT LOAM	382	BELKNAP SILT LOAM, BOTTOM

SLOPE SYMBOLS	EROSION SYMBOLS
A = 0 TO 1.5% SLOPE	SLOPE SYMBOL FOLLOWED BY + SIGN (FOR EXAMPLE, A+) DENOTES LIGHT-COLORED SILTY SEDIMENT 8 TO 15 INCHES THICK ON A NORMAL SURFACE SOIL. ALSO, IN THE VICINITY OF HERRIN, + ON SMALL BOTTOMLANDS INDICATES MINE-WASH MATERIAL HAS COVERED THE AREA.
B = 1.5 TO 4% SLOPE	SLOPE SYMBOL ALONE (FOR EXAMPLE, C) DENOTES NONE TO SLIGHTLY ERODED (OVER 7 INCHES OF SURFACE AND SUBSURFACE SOIL REMAINING).
C = 4 TO 7% SLOPE	SLOPE SYMBOL OVERSCORED (FOR EXAMPLE, $\overline{C}$ ) DENOTES MODERATELY ERODED (3 TO 7 INCHES OF SURFACE AND SUBSURFACE SOIL REMAINING).
D = 7 TO 12% SLOPE	SLOPE SYMBOL UNDERSCORED (FOR EXAMPLE, $\underline{C}$ ) DENOTES SEVERELY ERODED (LESS THAN 3 INCHES OF SURFACE AND SUBSURFACE SOIL REMAINING).
E = 12 TO 18% SLOPE	★ STAR FOLLOWING SLOPE SYMBOL DENOTES PRESENCE OF NUMEROUS MINE SINKS IN AREA.
F = 18 TO 30% SLOPE	
G = OVER 30% SLOPE	

CONVENTIONAL SYMBOLS.					
	PAVED ROAD		LARGE RIVER		TOWN
	BLACKTOP OR 1-LANE PAVED ROAD		SMALL FLOWING STREAM		TOWN
	GRAVEL OR MINE-WASTE ROAD		NONCROSSABLE DRAINAGE		
	IMPROVED DIRT ROAD		CROSSABLE DRAINAGE		
	PRIVATE LANE		POND OR LAKE		HOUSE
	RAILROAD		SWAMPY AREA		SCHOOL
	RAILROAD (2 OR MORE TRACKS)		DAM		CHURCH
	ABANDONED RAILROAD		MINE DUMP		BUSINESS ESTABLISHMENT
	LEVEE (TICKS-PROTECTED SIDE)		BORROW PIT		LARGE BUILDING
	SANDSTONE OUTCROP		SURFACE MINE		SHAFT MINE
	COUNTY BOUNDARY				CEMETERY
	TOWNSHIP BOUNDARY				
SCALE					

SCALE 0 1/4 1/2 1 2 MILES

A. J. CLINE, SOIL CORRELATOR  
UNITED STATES DEPARTMENT OF AGRICULTURE

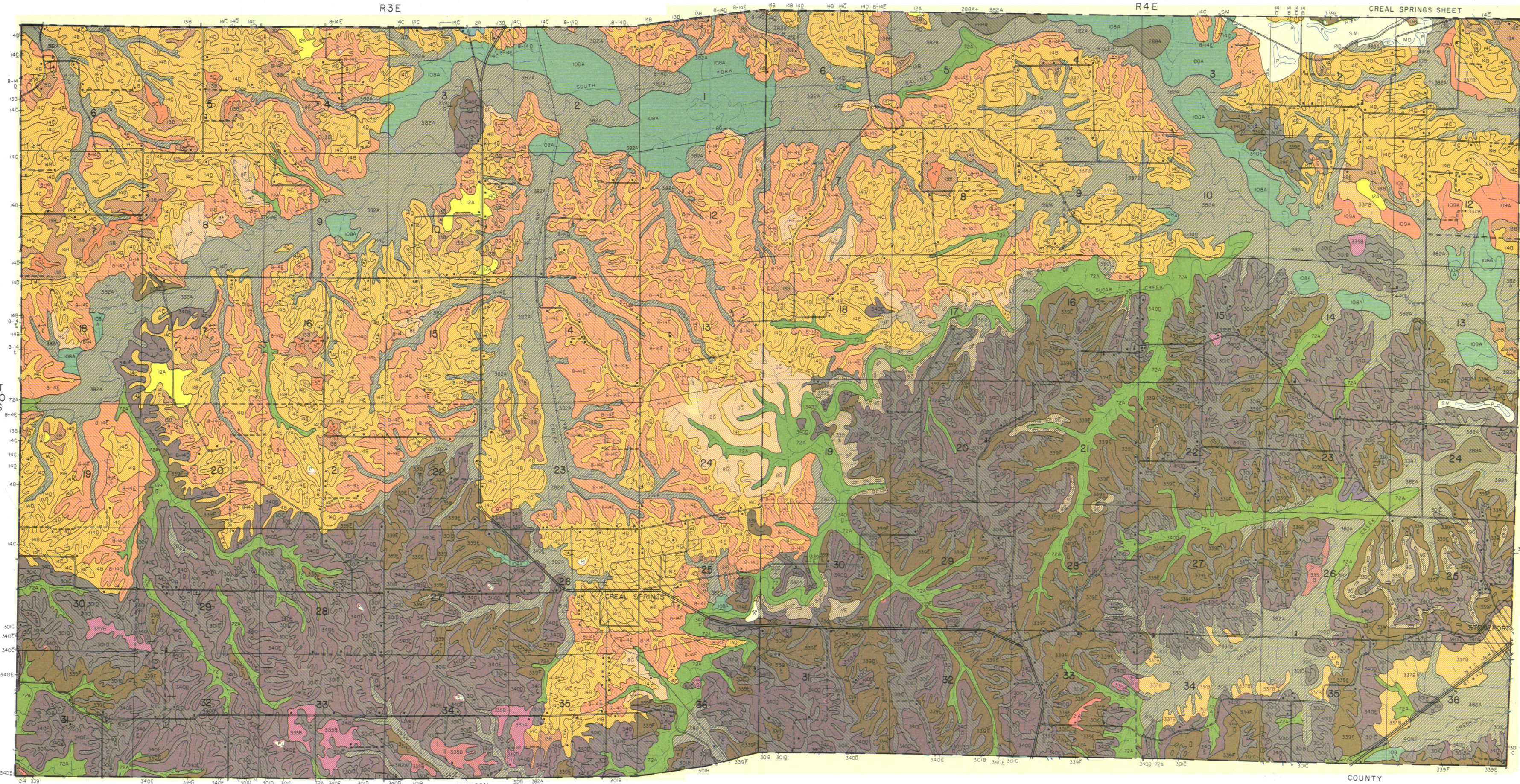
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UNIVERSITY OF ILLINOIS AGRICULTURAL EXPERIMENT STATION, AND H. R. MCCULLOCH, SOIL CONSERVATION SERVICE, USDA.

**SOIL SURVEY MAP OF WILLIAMSON COUNTY, ILLINOIS**

UNIVERSITY OF ILLINOIS AGRICULTURAL EXPERIMENT STATION  
IN COOPERATION WITH  
UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE





### SOIL TYPES

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★ STAR FOLLOWING SLOPE SYMBOL DENOTES PRESENCE OF NUMEROUS MINE SINKS IN AREA.

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IMPROVED DIRT ROAD	CROSSABLE DRAINAGE	SCHOOL
PRIVATE LANE		CHURCH
RAILROAD	POND OR LAKE	BUSINESS ESTABLISHMENT
RAILROAD (2 OR MORE TRACKS)	SWAMPY AREA	LARGE BUILDING
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SANDSTONE OUTCROP	SURFACE MINE	
COUNTY BOUNDARY		
TOWNSHIP BOUNDARY		

### SCALE

0 1/4 1/2 1 2 MILES

A. J. CLINE, SOIL CORRELATOR  
UNITED STATES DEPARTMENT OF AGRICULTURE

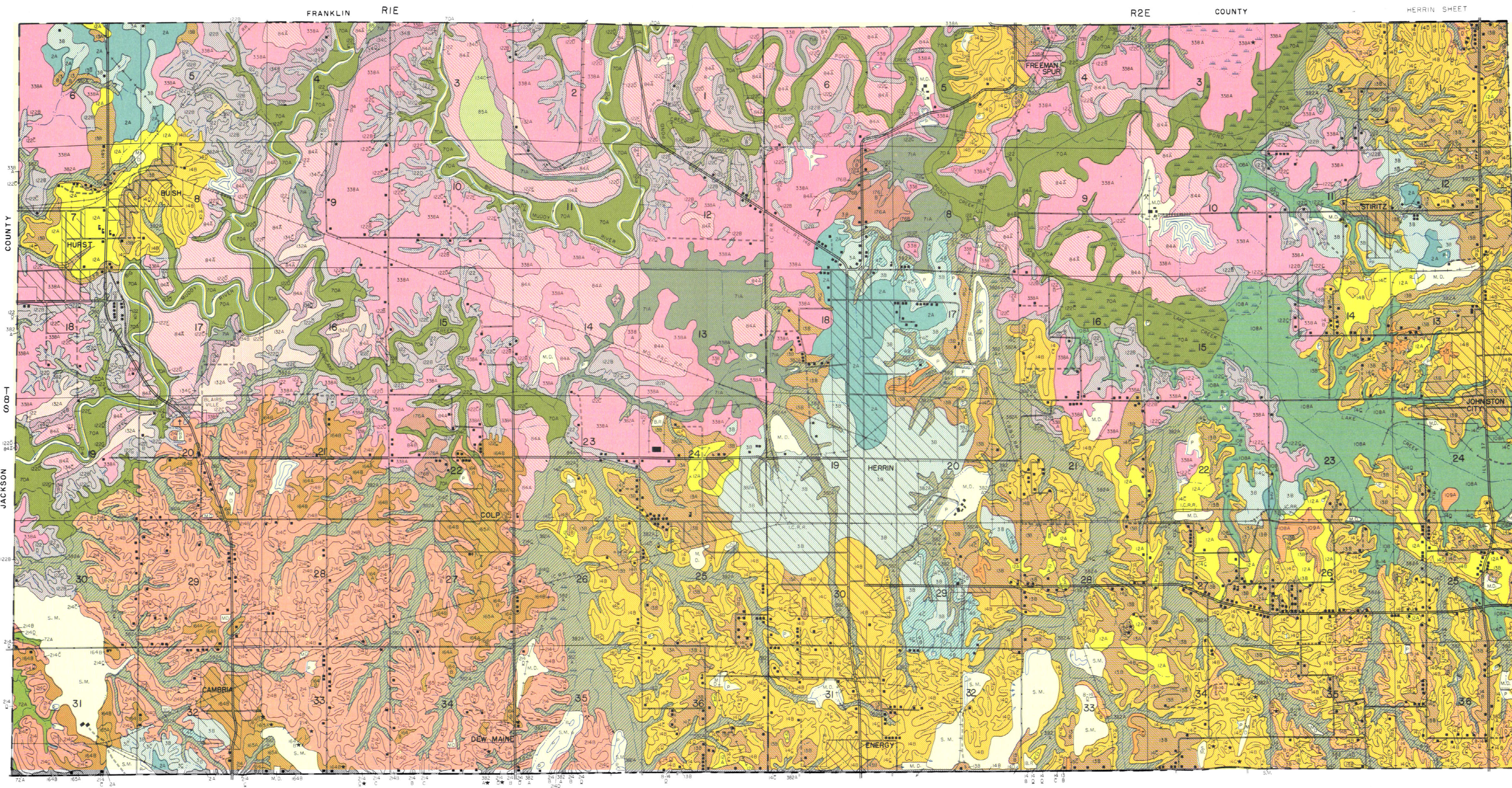
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SOILS SURVEYED BY: J. B. FEHRENBACHER, IN CHARGE, J. D. ALEXANDER, R. A. BOHANNON, W. R. OSCHWALD AND R. H. RUST  
UNIVERSITY OF ILLINOIS AGRICULTURAL EXPERIMENT STATION, AND H. R. MCCULLOCH, SOIL CONSERVATION SERVICE, USDA.

## SOIL SURVEY MAP OF WILLIAMSON COUNTY, ILLINOIS

UNIVERSITY OF ILLINOIS AGRICULTURAL EXPERIMENT STATION  
IN COOPERATION WITH  
UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE





# SOIL TYPES

2	CISNE SILT LOAM	70	BEAUCOUP SILTY CLAY LOAM, BOTTOM	167	LUKIN SILT LOAM
3	HOYLETON SILT LOAM	71	DARWIN CLAY, BOTTOM	176	MARISSA SILT LOAM
4	RICHVIEW SILT LOAM	72	SHARON SILT LOAM, BOTTOM	214	HOSMER SILT LOAM
5	BLAIR SILT LOAM	84	OKAW SILT LOAM	287	CHAUNCEY SILT LOAM
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8-14	HICKORY LOAM-AVA SILT LOAM, COMPLEX	108	BONNIE SILT LOAM, BOTTOM	301	GRANTSBURG SILT LOAM
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**SLOPE SYMBOLS**

A = 0 TO 1.5% SLOPE  
B = 1.5 TO 4% SLOPE  
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**EROSION SYMBOLS**

SLOPE SYMBOL FOLLOWED BY + SIGN (FOR EXAMPLE, A+) DENOTES LIGHT-COLORED SILTY SEDIMENT 8 TO 15 INCHES THICK ON A NORMAL SURFACE SOIL. ALSO, IN THE VICINITY OF HERRIN, + ON SMALL BOTTOMLANDS INDICATES MINE-WASH MATERIAL HAS COVERED THE AREA.

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IMPROVED DIRT ROAD	CROSSABLE DRAINAGE	SCHOOL
PRIVATE LANE	POND OR LAKE	CHURCH
RAILROAD	SWAMPY AREA	DAM
RAILROAD (2 OR MORE TRACKS)	MINE DUMP	BUSINESS ESTABLISHMENT
ABANDONED RAILROAD	BP	LARGE BUILDING
LEVEE (TICKS-PROTECTED SIDE)	SM	SHAFT MINE
SANDSTONE OUTCROP		CEMETERY
COUNTY BOUNDARY		
TOWNSHIP BOUNDARY		

**SCALE**

0 1/4 1/2 1 2 MILES

A. J. CLINE, SOIL CORRELATOR  
UNITED STATES DEPARTMENT OF AGRICULTURE

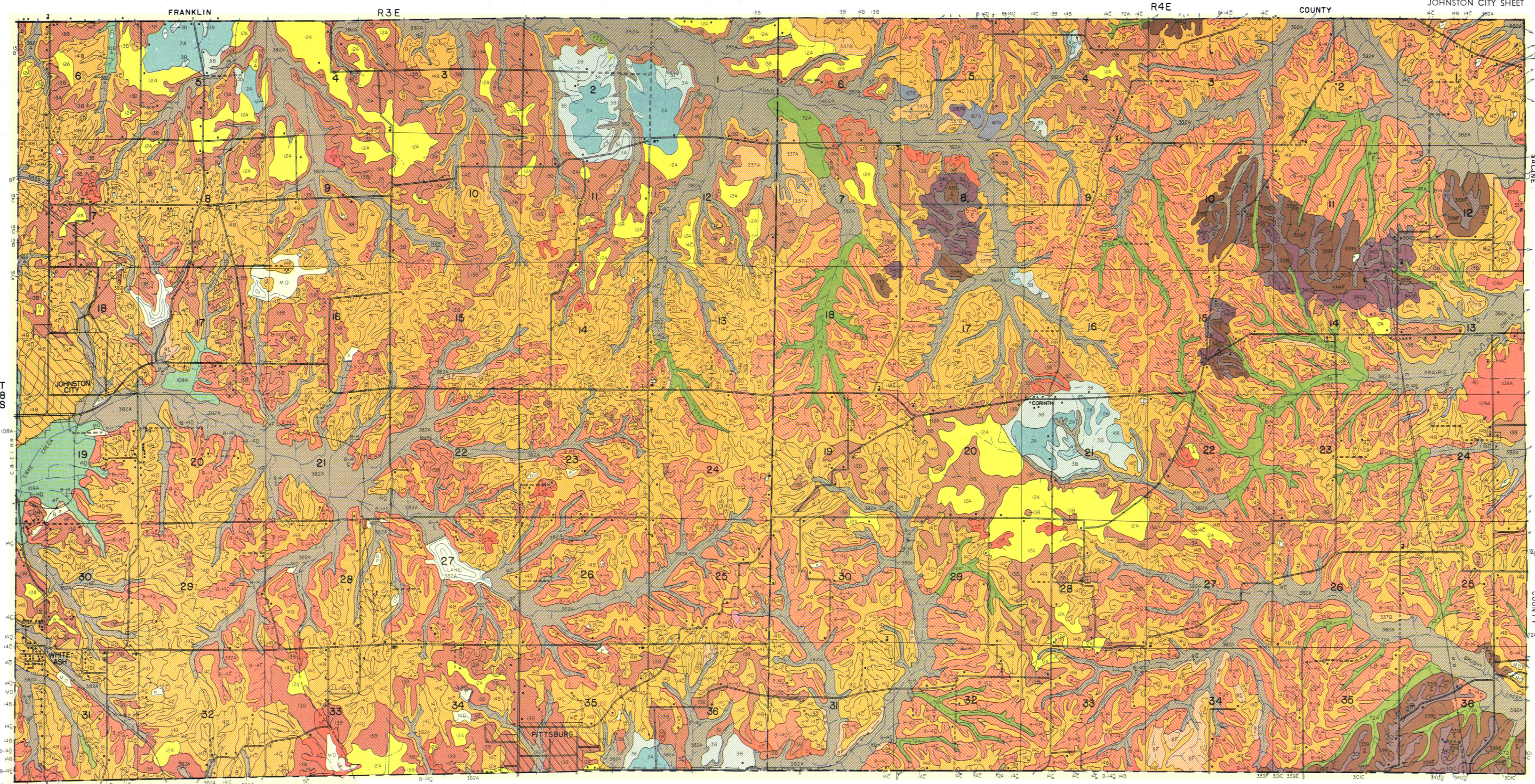
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RAILROAD (2 OR MORE TRACKS)	SWAMPY AREA	LARGE BUILDING
ABANDONED RAILROAD	MINE DUMP	SHAFT MINE
LEVEE (TICKS=PROTECTED SIDE)	MD	CEMETERY
SANDSTONE OUTCROP	BP	
COUNTY BOUNDARY	SM	
TOWNSHIP BOUNDARY		

**SCALE**  
0 1/4 1/2 1 2 MILES

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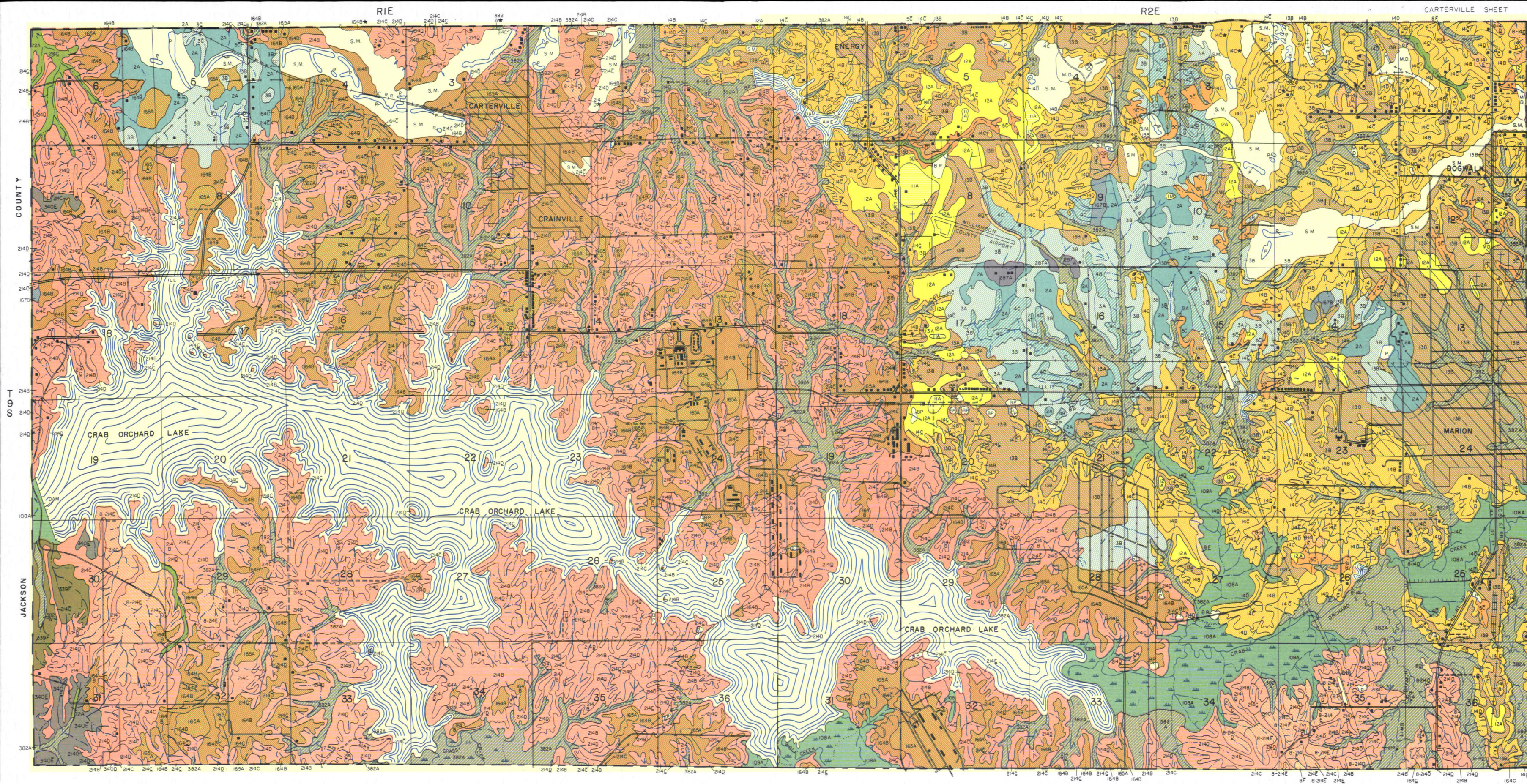
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COUNTY BOUNDARY	
TOWNSHIP BOUNDARY	
	TOWN
	TOWN
	HOUSE
	SCHOOL
	CHURCH
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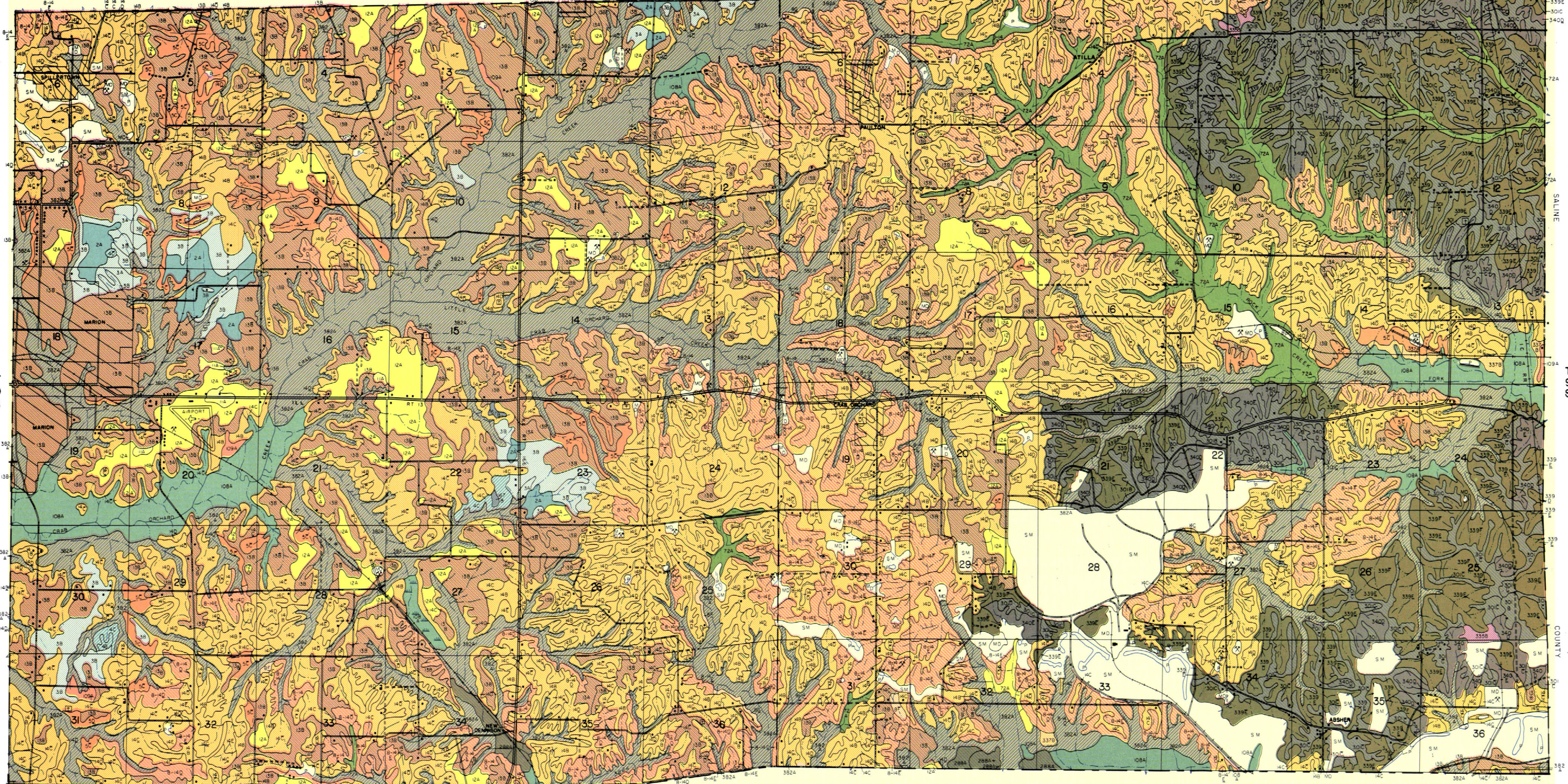
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R3E

R4E

MARION SHEET



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